

# **AMMUNITION QUICKLOAD PROGRAM**

**105 MM and 120 MM Tank Ammunition Download Rack**

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#### ACKNOWLEDGEMENTS

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## I. INTRODUCTION

The purpose of this report is to outline requirements for construction of a rack which can be used for temporary storage of 105mm tank ammunition or 120mm tank ammunition in congested areas, consistent with DOD explosive safety criteria.

## II. BACKGROUND

Reference is made to DOD 6055.9 STD, DOD Ammunition and Explosives Safety Standards (1) and AR 385-64, Ammunition and Explosives Safety Standards (2), which implements the Department of Defense Standards. Reference is also made to Ballistic Research Laboratory Memorandum Report entitled 'Temporary Tank Ammunition Storage Facility' (3). Quantity-distance (Q-D) criteria for storage of conventional ammunition are designed to provide an appropriate level of protection against blast and fragment hazards. Explosives safety distance tables describe necessary separations and specify maximum quantities of the various classes of explosives permitted in any one location. These tables reflect acceptable minimum criteria for storage and handling of explosives. Such criteria provide reasonable safety with specified limits compatible with the risks of an accidental explosion. Both the DOD 6055.9-STD and the AR which implements this standard for Army installations and activities provide the opportunity for reduced hazard distances corresponding to reduced fragment and blast hazards, if it can indeed be demonstrated that the hazards are reduced. The burden of proof is upon the initiating activity to demonstrate an acceptable level of safety, however.

## III. RATIONALE

The design of this storage rack was predicated upon the assumption that the rack should control explosion size, thus limiting the maximum credible event to some small fraction of the total stores, and should also control fragment hazards. The rack specified here limits the maximum credible event to the explosion or detonation of one warhead, with a corresponding blast radius (inhabited building distance) of 50 feet for the 105mm ammunition and 75 feet for the 120mm ammunition. By constructing the rack as specified with the appropriate sand filled barricades, primary fragments are contained completely, kickouts are reduced to a minimum, and the fragment hazard radius based upon one hazardous fragment per 600 square feet, is also less than 50 feet for the 105mm ammunition and 75 feet for the 120mm ammunition. Thus, when either 105mm M456 HEAT ammunition or 120mm M830 HEAT ammunition, along with the other nonexplosive conventional antitank ammunition are stored in the rack (warheads facing the rear of the rack), the appropriate hazard distance is 50 feet, or 75 feet respectively regardless of the total number of rounds stored at one site.

#### IV. RACK DESCRIPTION

The 105mm and 120mm Ammo Storage Facility consists of three primary components, the ammo racks which hold the ammunition, the rack containment structure, and the walls which enclose the rack containment structure. The rack containment structure is identical for the 105mm and 120mm ammo storage facility except for one minor difference in the layout of the walls. The racks holding the ammunition are different for the two types of ammunition and separate drawings are given for each. The storage racks and the rack containment structure are welded steel structures. The roof of the rack containment structure and the walls are soiled filled in order to provided a fragment absorbing barrier around the storage racks.

Three different options for the walls have been included. Option 1 utilizes a welded angle iron frame with corrugated siding to contain the soil. Option 2 uses a steel pipe frame held together with pipe clamps and the corrugated siding to contain the soil. Option 3 uses two foot diameter corrugated steel pipe as walls to contain the soil. Any one of the three options may be chosen for the facility. Drawings of each option are enclosed. Additional bracing is required to contain the blast and fragments from an accidental explosion for the long wall in front of the storage racks. There are three separate options presented which may be used for bracing this long front wall. Option A is a series of triangular frames constructed from welded angle iron. Option B uses steel pipes placed vertically against the wall and buried to a minimum depth of three feet, and option C is a second wall directly behind the main wall but at half the height. All three options are shown in construction options 1 and 2 and only bracing option C (half height wall) is shown in construction option 3.

A drawing of the 120mm storage facility option 1A (angle iron wall frame with triangular bracing) is shown in figure 1. An overhead plan of the facility is shown in figure 2. For the 105mm storage facility the two wing walls labeled W2 in figure 2 would (could) be excluded. The exclusion of those two walls and the ammunition racks are the only physical differences between the 105mm and the 120mm storage facilities. Figures 3 and 4 show the 120mm storage facility option 1B (angle iron wall frames with steel pipe bracing) and figures 5 and 6 show the 120mm storage facility option 1C (angle iron wall frames with half height wall). Again the wall sections W2 in figures 4 and 6 would (could) be excluded for the 105mm storage facility. The typical wall frame for option 1 (angle iron wall frames) is shown in figures 7 and 8 and the cross bracing and attachment details for attaching the walls is shown in figures 9 and 10. Figures 11 and 12 show details of bracing the wall using option A (triangular angle iron). Bracing options B and C are shown in figures 13 and 14 respectively. The 120mm storage facility using option 2A is shown in figures 15 and 16. Figures 17 and 18 show option 2B and figures 19 and 20 show option 2C. Again sections W2 in figure 16, 18, and 20 would (could) be excluded for the 105mm storage facility. The typical steel pipe wall frames for option 2 is shown in figure 21 with the pipe clamps shown in figure 22.

details on attaching the corrugated steel and the wall is shown in figures 23 and 24. The wall bracing details for option A is shown in figures 25 and 26 and details for options B and C are shown in figures 27 and 28 respectively. The 120mm storage facility using option 3 with the half height walls is shown in figures 29 and 30. For the 105mm storage facility to eliminate the wing walls (if desired) the last six corrugated steel pipes on each side (for a total of twelve) can be excluded. Figures 31, 32, and 33 show details of the steel pipe walls and figure 34 is the diagram for attaching the walls.

The rack containment structure to be used regardless of which wall option is used is shown in figures 35 through 39. The 120mm ammo rack is shown in figure 40 and the loading details for each bay is shown in figures 41 and 42. The bays are labeled in figure 35. The 105mm ammo rack is shown in figure 43 and the loading details for each bay is shown in figures 44 and 45. The empty containers in bays 1 and 3, labeled E in figure 44, can be used for additional KE rounds provided that the adjoining HE containers are empty.

#### V. USE OF THE RACK

The rack may be used to provide temporary storage of 105mm or 120mm tank ammunition, provided the rack is configured as described above for the ammunition stored. The ammunition must be stored in the racks such that the warheads face towards the rear of the rack, provided the rack is located in excess of 50 feet from the nearest inhabited building for the 105mm ammunition and 75 feet for the 120mm ammunition, and provided express approval for siting is obtained from the DOD Explosive Safety Board. The 105mm ammo storage facility can easily be modified to store 120mm ammunition, provided it is 75 feet from the nearest inhabited building, by changing the ammo racks and adding the wing walls. For this reason if the possibility exists of changing to the 120mm ammunition in the future siting of the storage facility should take into consideration the larger Q-D (75 feet) for the 120mm storage facility.

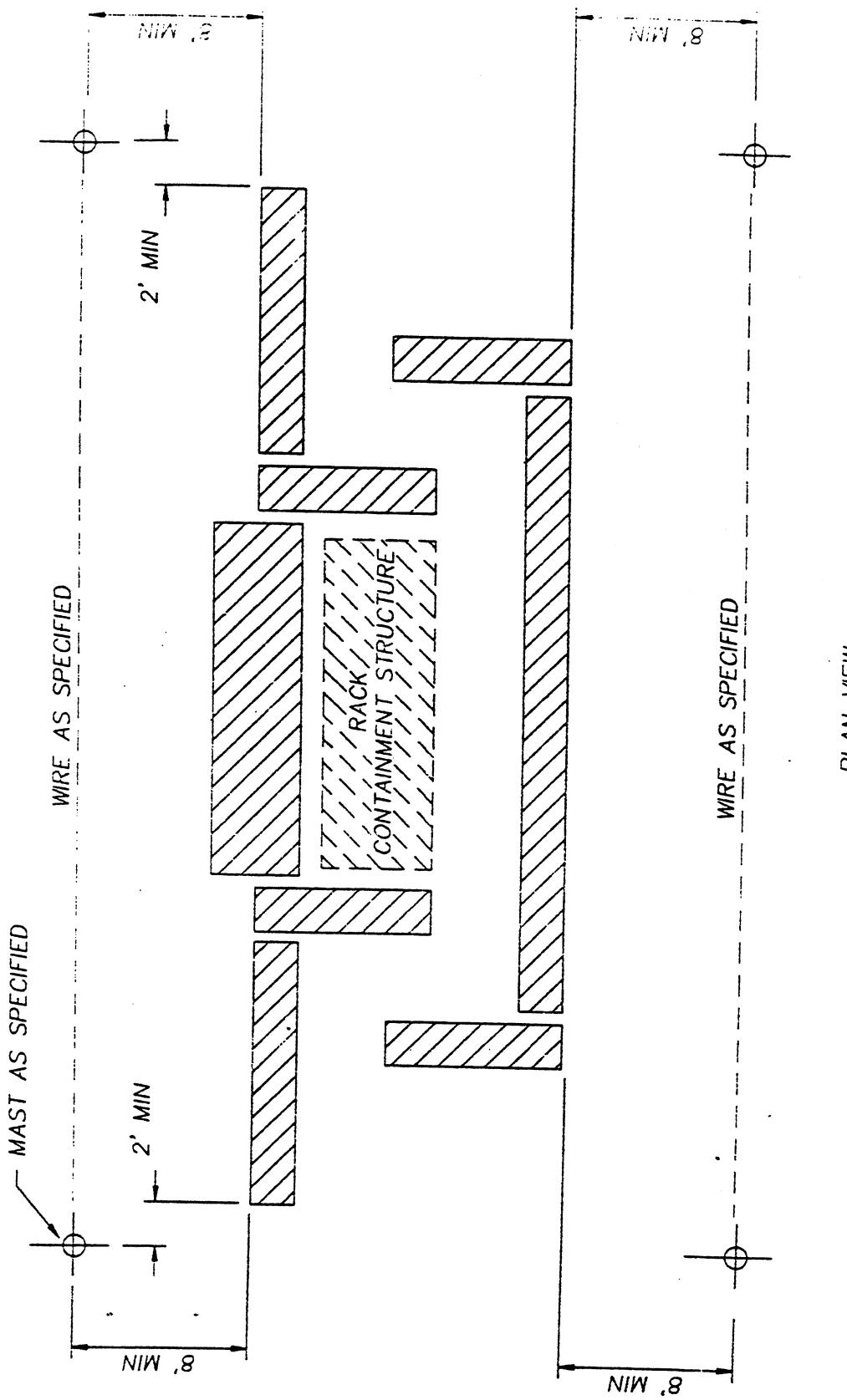
## GENERAL NOTES

1. All structural steel plates and angles shall conform to A.S.T.M. designation A36 for structural steel. The steel pipe columns and braces shall conform to A.S.T.M. A36 or A53.
2. All corrugated sheet steel shall be galvanized and shall conform to A.S.T.M. designation A-527 G90. This material shall conform to either of the following sets of dimensions: Thickness = 0.0516", Pitch = 2-2/23", Depth = 5/8"; or Thickness = 0.0336", Pitch = 2-2/3", and Depth = 7/8".
3. All pipes as used in the wall (Facility Option 3) shall be corrugated, galvanized, and of a minimum 14 gauge thickness. Painting of these pipes is not required.
4. Black Polyethylene sheeting with a minimum thickness of 6 millimeters shall be used beneath all walls to provide a moisture barrier between the ground and the soil backfill.
5. All welding shall be done as per drawings by an electric arc process.
6. Self drilling screws shall be either zinc plated or stainless steel.
7. All backfill used in the walls and rack containment roof structure shall be a well-drained, granular material. For this purpose, clean masonry sand need not be used. Any available grade of dirt is acceptable. All backfill shall be carefully placed so as to minimize voids. No special compaction is required.
8. The tops of all walls and the roof of the rack containment structure shall be completely covered by a durable, water-proofing membrane so as to prevent water infiltration to the soil backfill and the rack storage bays. This material should be adequately secured so as to remain in place during heavy winds and shall be placed so as to prevent ponding of water.
9. All metal surfaces, except those which are galvanized, shall be prepared and painted in accordance with the Corps of Engineers Guide Specification 09900 for exterior ferrous surfaces. Painting of the angle iron or pipe members used in the walls should be completed before placement of the corrugated sheet panels. Painting of the soil-containing portion of the rack containment structure should be completed before placement of the backfill.
10. A lightning protection system must be installed. It is recommended to use an "Overhead Wire System" in accordance with AR 385-64. The masts and wires shall be placed symmetrically around the structure as shown on the attached drawing. If this particular system is not practical for a certain location, other options are outlined in AR 385-64.

Each wire shall be a continuous run of not less than No. 1/0 AWG copper or copper-coated steel cable suspended between the masts (as shown) and connected to ground rods at each end or to a counterpoise. A counterpoise is required only if 10 ohms maximum resistance to ground is not readily attainable with ground rods. The wires shall be connected to the top of each mast at a minimum elevation of 14.5 feet and shall not come any closer to the ground surface than 12 feet along its length.

Each mast shall consist of a standard steel pipe, capped at the top, not less than 3.5 inches in diameter, or a treated timber pole, not less than 6 inches in diameter. Each mast shall be set to a minimum depth of 6 feet, in a concrete-filled hole. The hole diameter shall be not less than 4 inches larger than the diameter of the mast.

11. Rack lifetime is estimated to be ten (10) years.



1. LAYOUT OF OVERHEAD WIRE LIGHTNING PROTECTION SYSTEM

(Options 1 and 2)

1. Level site.
2. Lay out footings for rack containment structure (RCS)
3. Pour footings and embed steel base plates in wet concrete, and level.
4. Lay out walls and lay down black polyethylene moisture barriers for walls.

NOTE: Allow enough space between walls W1, W3, and the RCS to facilitate construction of the RCS after the walls are in place. Approximately two feet recommended.

5. Construct frames for walls W1, W2, and W3.
6. Paint all angle iron portions of walls (including external cross-bracing not yet attached).
7. Attach corrugated sheet steel and cross-braces to walls W1, W2, and W3.
8. Construct RCS.
9. Construct three ammo storage racks in front of RCS.
10. Move ammo storage racks into RCS.
11. Construct walls W4 and W5 as outlined in steps 5 - 7 above.
12. Paint walls W4 and W5, RCS, and ammo racks.
13. Place backfill material in all walls and RCS.
14. Cover tops of all walls and RCS with waterproof membrane and secure.
15. Install and secure chain link fencing over entire facility.
16. Install lightning protection system as specified.

(OPTION 3)

1. Level site.
2. Lay out footings for rack containment structure (RCS)
3. Pour footings and embed steel base plates in wet concrete, and level.
4. Lay out walls and lay down black polyethylene moisture barriers for walls.

NOTE: Allow enough space between walls, W1, W3, and the RCS to facilitate construction of the RCS after the walls are in place. Approximately two feet recommended.

5. Construct the rear wall. The angle iron braces should be painted before attachment to the walls.
6. Construct RCS.
7. Construct three ammo storage racks in front of RCS.
8. Paint the RCS and the ammo storage racks.
9. Move the ammo storage racks into RCS.
10. Construct the front wall.
11. Place backfill material in all walls and the RCS.
12. Cover tops of all walls and RCS with waterproof membrane and secure.
13. Install and secure chain link fencing over entire facility.
14. Install lightning protection system as specified.

BILL OF MATERIALS FOR THE 105mm STORAGE RACKS

Description	Material	Dimensions	No. Required
Vertical braces (f & r)	2"x2"x1/4" angle	52"	12
Vertical braces (sides)	"	52"	12
Diagonal braces (sides)	"	56"	6
Top hor. braces (f & r)	"	42"	6
Top lateral braces	"	41"	6
Top diagonal braces	"	42"	3
Longitudinal braces (top)	"	40-1/2"	6
Base supports (f & r)	C4 x 5.4	42"	6
Base supports (sides)	"	44"	6
Rear cover plates	1/4" plate	52-3/8" x 44"	3
Shelf plates (front)	"	18" x 42"	24
Shelf plates (rear)	"	18" x 42"	24
Munition containers			126

NOTE: The quantities in this list are for a total of three racks.

BILL OF MATERIALS FOR THE 120mm STORAGE RACKS

Description	Material	Dimensions	No. Required
Vertical braces (f & r)	2"x2"x1/4" angle	52"	12
Vertical braces (sides)	"	52"	12
Diagonal braces (sides)	"	52"	12
Top hor. braces (f & r)	"	52"	6
Top lateral braces	"	39-1/2"	6
Top diagonal braces	"	39"	6
Longitudinal braces (top)	"	42"	3
Base supports (f & r)	C4 x 5.4	40-3/4"	6
Base supports (sides)	"	39-1/2"	6
Rear cover plates	1/4" plate	41-1/4"	6
Shelf plates (front)	"	52" x 39-1/2"	3
Shelf plates (rear)	"	17-1/2" x 39-1/2"	21
Munition containers		18-3/4" x 39-1/2"	21
			90

NOTE: The quantities in this list are for a total of three racks.

BILL OF MATERIALS FOR WALLS (OPTION 1)

NOTE: All materials in this list are 2" x 2" x 1/4" unless noted

Description	Dimensions	No. Required			
		W1	W2	W3	W4
Vertical frame member	6' 0"	18	28	20	20
Hor. frame member (t & b)	1' 10"	32	48	32	32
Hor. frame member (intermediate)	1' 10"	32	48	32	32
Hor. frame member (ends, t & b)	1' 10"	4	8	8	8
Hor. frame member (ends, inter.)	1' 8"	4	8	8	8
Front-to-back ties	1' 8"	21	30	18	18
Corrugated sheet steel	See Gen Notes (sq. ft.)	240	336	224	224
Bolts	3/8" dia. self drilling	90	144	112	112
Cross-bracing (ends of walls)	2' 0"	8	16	16	16
Cross-bracing (f & r) for W1	16' 0"	8	--	--	--
" "	12' 0"	--	16	--	--
" "	8' 0"	--	--	16	--
" "	8' 0"	--	--	--	16
	28' 0"	--	--	--	--
<u>Bracing Option A:</u>					
Front vertical members	6' 0"				
Rear slanted members	7' 1"				12
Lower horizontal members	3' 9"				12
Mid horizontal members	2' 7"				12
Upper hor. members	1' 4"				6
Diagonal brace	2' 6"				6
" "	2' 0"				6
" "	2' 1"				6
Attachment angles	0' 6"				6
					18
<u>Bracing Option B:</u>					
3" dia. Std. Steel Pipe	9' 0"				6
<u>Bracing Option C:</u>					
Vertical frame member	3' 0"				
Hor. frame member (t & b)	1' 10"				11
Hor. frame member (ends, t & b)	1' 8"				20
Front-to-back ties	1' 8"				4
Cross-bracing (ends of walls)	2' 0"				18
Cross-bracing (front)	20' 0"				4
					2

BILL OF MATERIALS FOR WALLS (OPTION 2)

NOTE: All materials in this list are 1-1/2" pipe unless noted.

Description	Dimensions	No. Required				
		W1	W2	W3	W4	W5
Vertical pipes (f & r)	6' 0"	18	28	20	20	30
Horizontal pipes (f & r)	See drawings	6	6	6	6	6
Lateral Pipes	2' 0"	31	50	38	38	49
Pipe clamps	---					
Corrugated sheet steel	See Gen Notes (sq. ft.)	116	184	136	136	182
Bolts	3/8" dia. self drilling	240	336	224	224	362
Cross-bracing (ends of walls)	2' 0"	90	144	112	112	136
Cross-bracing (f & r) for W1	16' 0"	6	12	12	12	6
" " " W2	12' 0"	6	--	--	--	--
" " " W3	8' 0"	--	12	--	--	--
" " " W4	8' 0"	--	--	12	--	--
" " " W5	28' 0"	--	--	--	12	--
		--	--	--	--	6
<u>Bracing Option A:</u>						
Front vertical members	6' 0"					
Rear slanted members	7' 1"					
Lower horizontal members	3' 9"					
Mid horizontal members	2' 7"					
Upper hor. members	1' 4"					
Diagonal brace	2' 6"					
" "	2' 0"					
" "	2' 1"					
Attachment angles	0' 6"					
		18				
<u>Bracing Option B:</u>						
3" dia. Std. Steel Pipe	9' 0"					
		6				
<u>Bracing Option C:</u>						
Vertical pipes	3' 0"					
Horizontal pipes	See drawings	9	14	10	10	15
Lateral pipes	2' 0"	2	2	2	2	2
Additional pipe clamps	4' 0"	18	14	10	10	30
Cross-bracing (ends of walls)	---	36	28	20	20	60
Cross-bracing (front)	2' 0"				4	
	20' 0"				2	

BILL OF MATERIALS FOR WALLS (OPTION 3)

Description	Dimensions	No. Required
2' diameter corrugated pipe	6' length	65
14 gage, galvanized	3' length	11
Corrugated steel sheet	See general notes	
1/4" thick steel plate	4" x 4" w/ 1/2" dia. hole 4" x 4" 5-1/2" x 4" 2" x 2" x 1/4" 3/8" dia. 6" length	1200 sq. ft. 250 4 4 850 ft 1000 120
Steel Angle		
Self-drilling screws		
3/8" dia. bolts w/nuts		

(2)

### BILL OF MATERIALS FOR RACK CONTAINMENT STRUCTURE

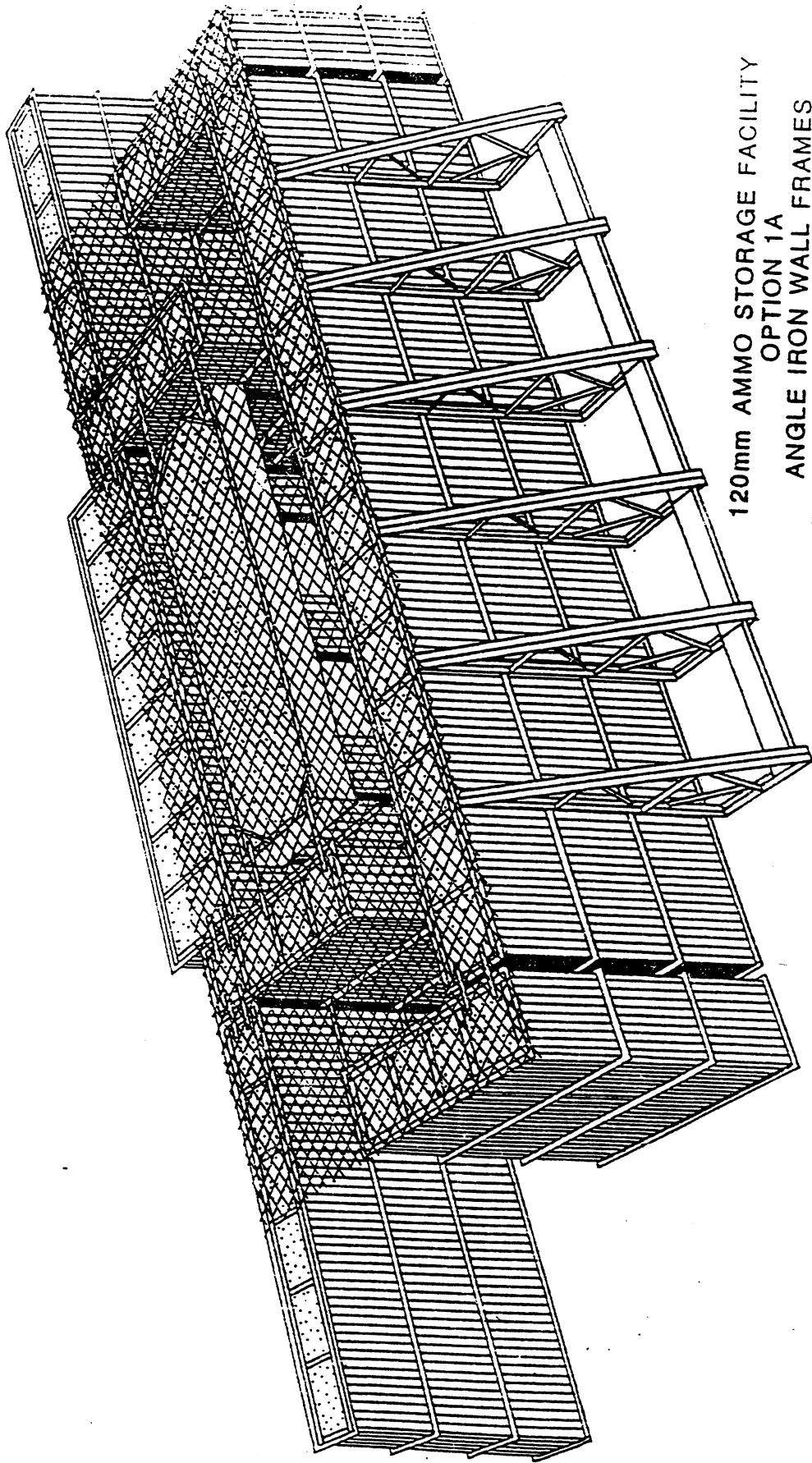
Description	Material	Dimensions	No.
<hr/>			
Support Structure for Roof:			
Columns			
Pipe bracing for columns	Std. 3" dia.	4' 11-3/4" L.	3
Side bracing (ext. columns)	"	5' 0"	2
Rear bracing for columns	2" x 2" x 1/4" angle	5' 1"	2
Steel shielding plates	"	5' 1"	3
Column base plates	1/4" plate	5' x 4'-9"	4
Column top plates	"	12" square	3
Concrete footings	Concrete	6-1/2" sq.	3
		2' x 2' x 6"	16 ft <sup>3</sup>
<hr/>			
Roof Structure:			
wall plates (at ends)	1/4" plate	5' 5-1/2" x 11-1/2"	1
wall plates (f & r)	"	15' 6" x 11-1/2"	1
Roof decking (outer edges)	"	3' 9-1/4" x 5' 6-1/2"	1
Roof decking (inner plates)	"	4' 0" x 5' 6-1/2"	1
Lower plate stiffeners (ends)	2" angle	5' 0"	2
Lower stiffeners (f & r)	"	15' 7-1/2"	2
Lower stiffeners (@ midspans)	"	5' 0"	2
Upper plate stiffeners (f & r)	"	15' 7-1/2"	2
Upper plate stiffeners (ends)	"	5' 0"	2
Top corner braces	"	1' 5"	2
Vertical corner stiffeners	"	7-1/2"	2
Vertical stiffeners (@ midspans)	"	7-1/2"	2
Diagonal plate braces	"	1' 3-1/2"	10

## REFERENCES

1. DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards.
2. AR 385-64, Ammunition and Explosive Safety Standards.
3. Howe, Philip M., and Collis, David L. "Temporary Tank Ammunition Storage Facility", BRL Memorandum Report No. 3424, Jan 85.

120mm AMMO STORAGE FACILITY  
OPTION 1A  
ANGLE IRON WALL FRAMES  
w/TRIANGULAR FRAME WALL BRACES

Figure 1



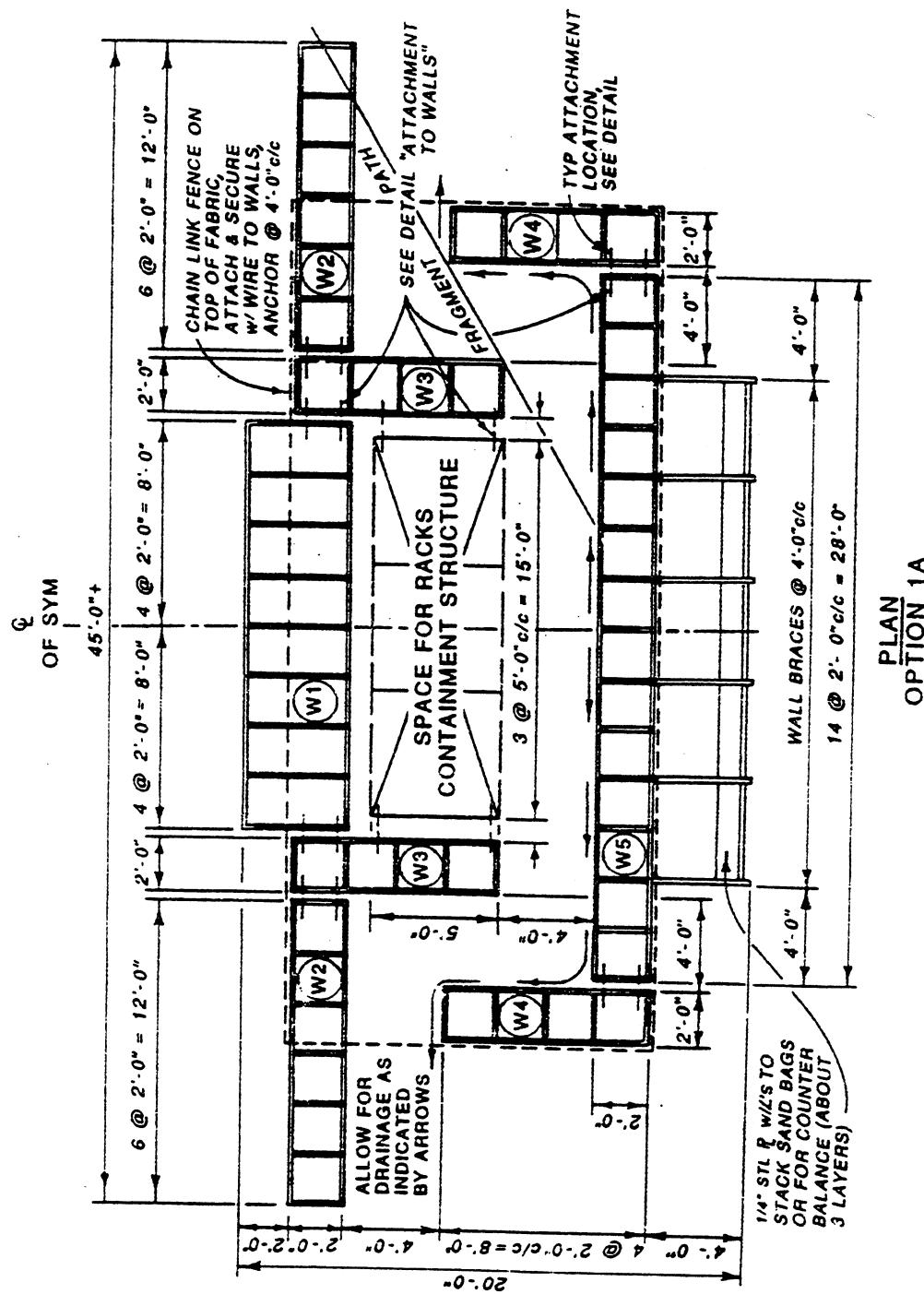


Figure 2

120mm AMMO STORAGE FACILITY  
OPTION 1B  
ANGLE IRON WALL FRAMES  
w/STEEL PIPE WALL BRACES

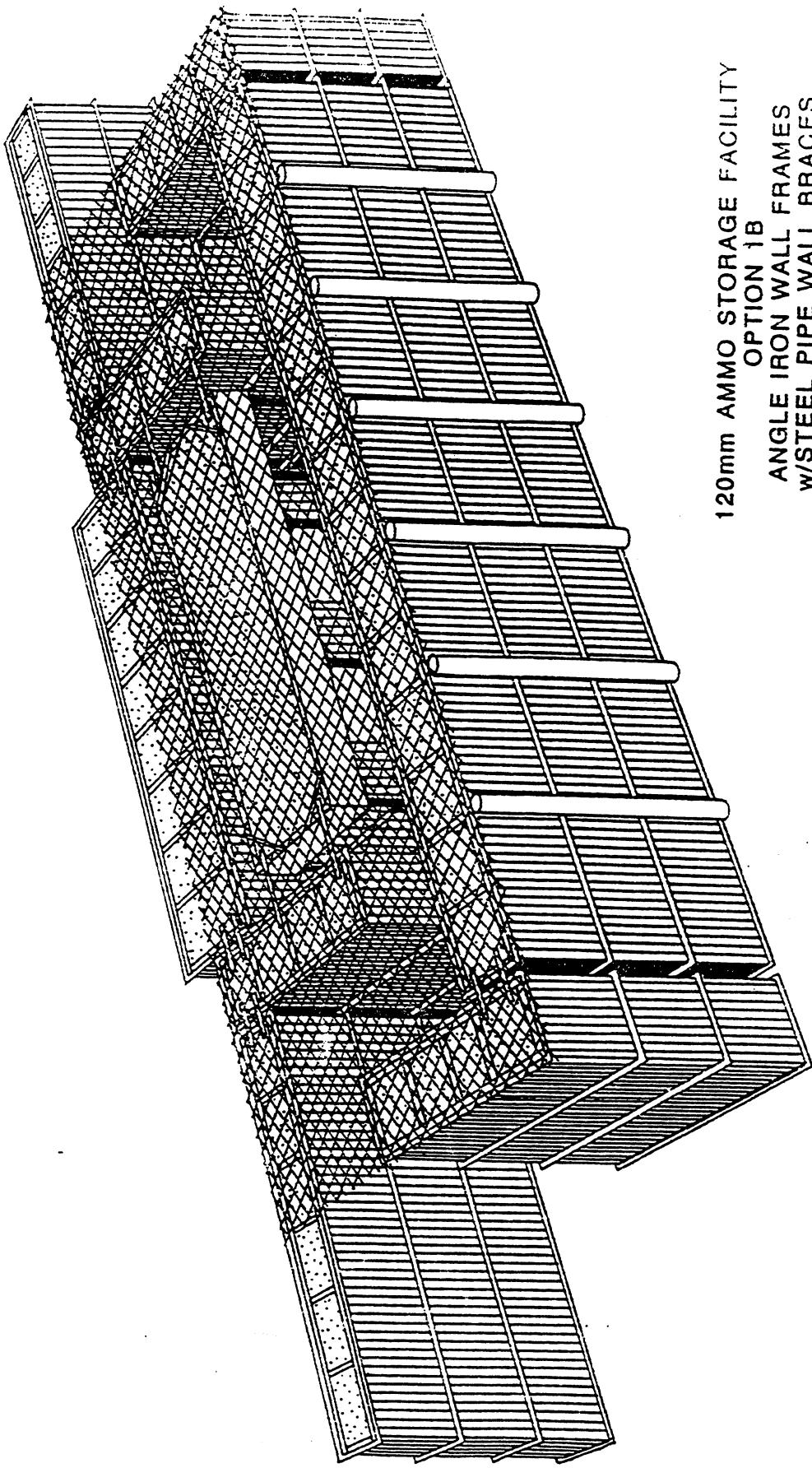


Figure 3

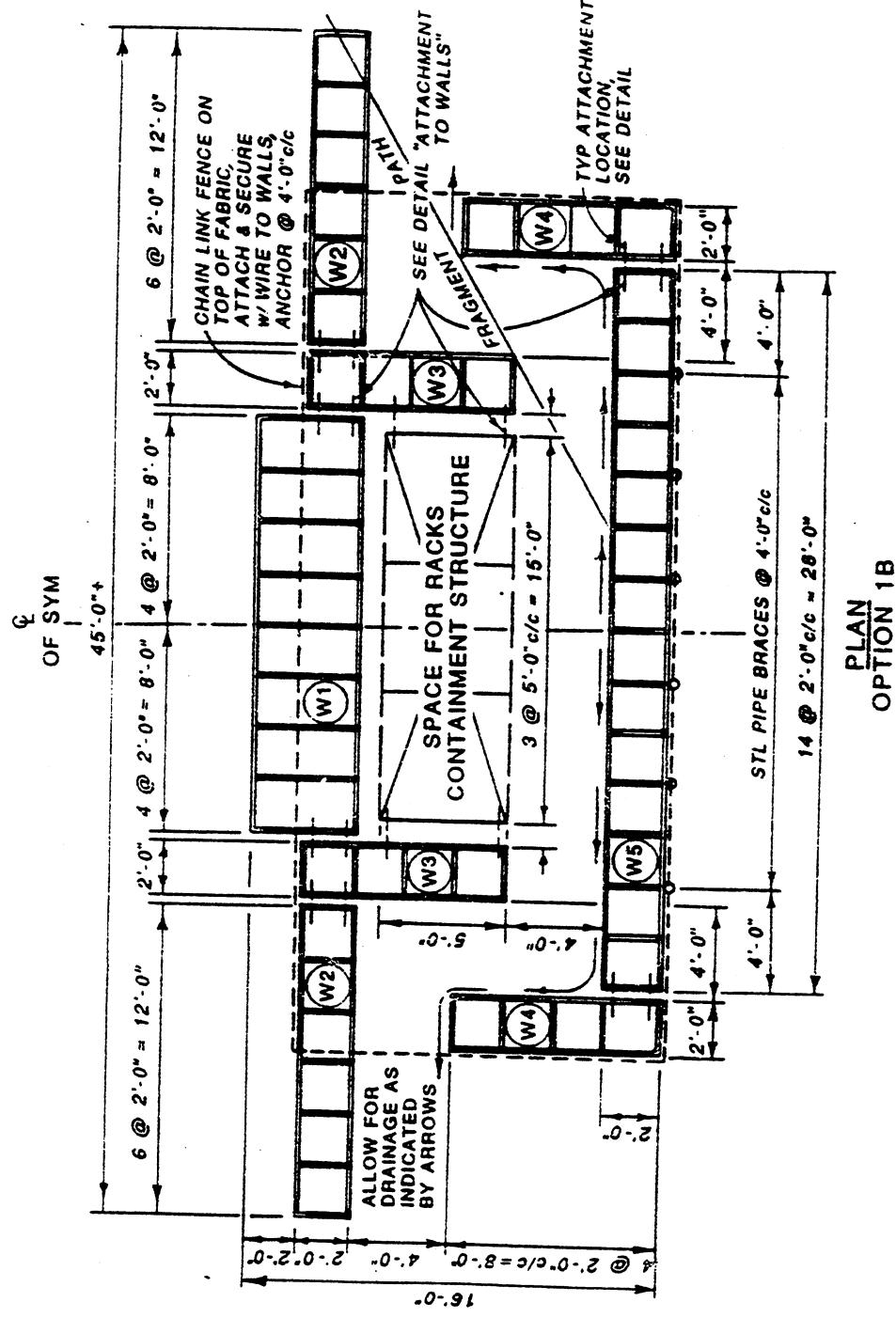


Figure 4

120mm AMMO STORAGE FACILITY  
OPTION 1C  
ANGLE IRON WALL FRAMES  
W/HALF-HEIGHT WALLS

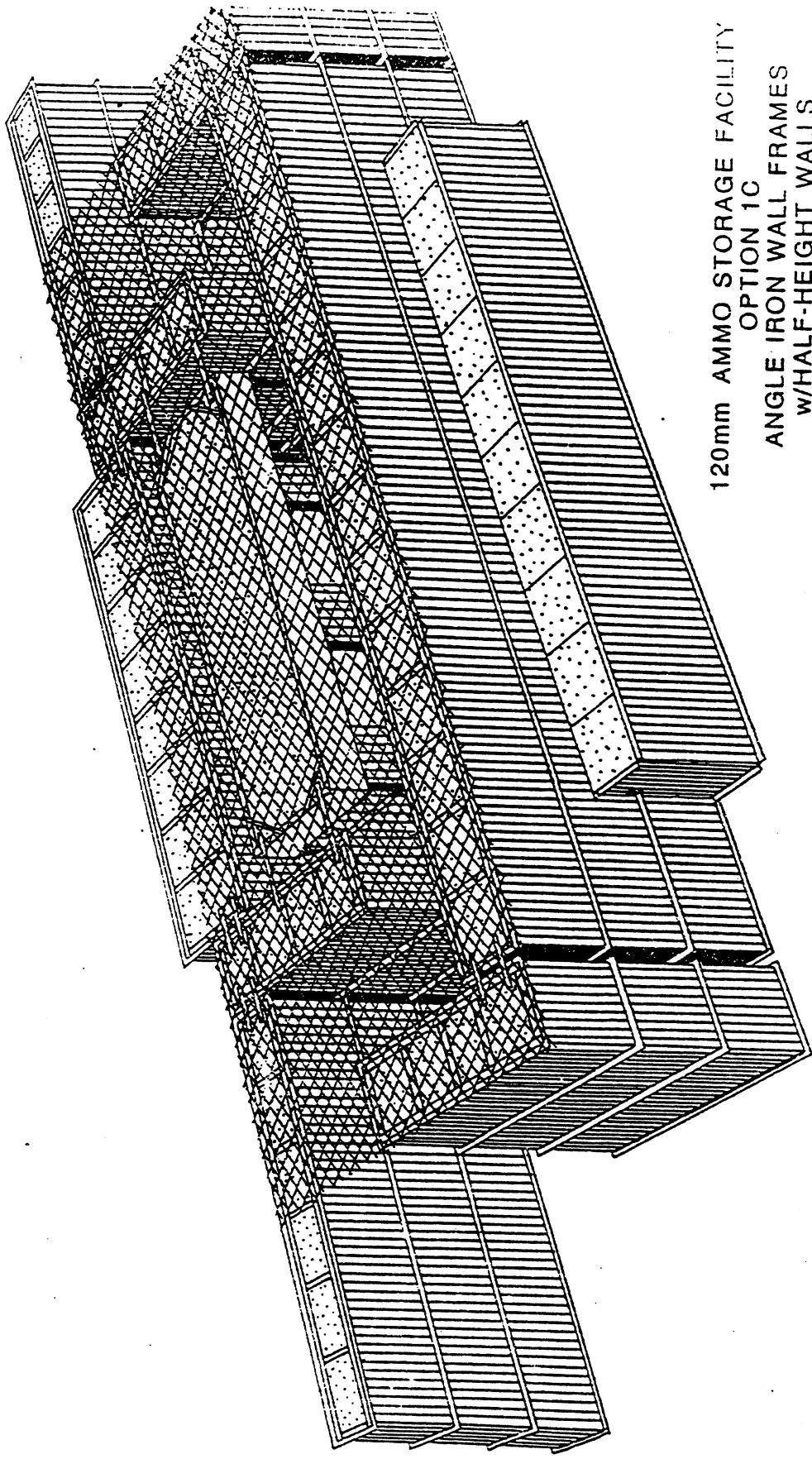


Figure 5

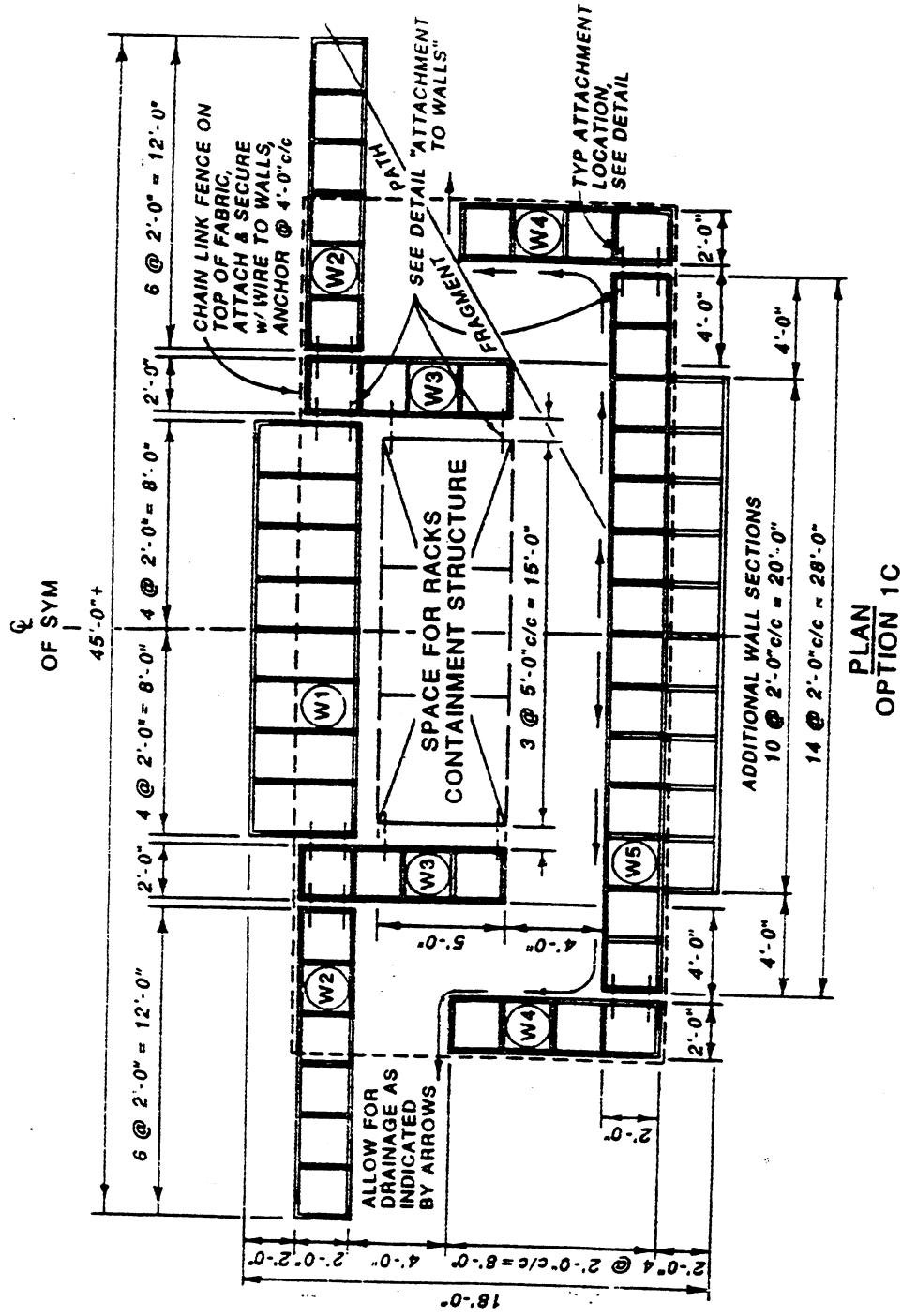
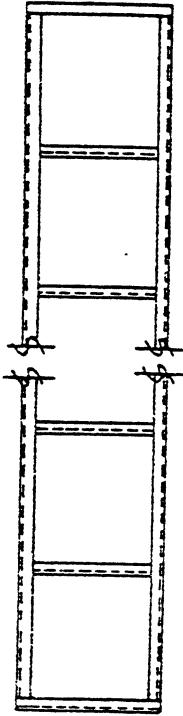


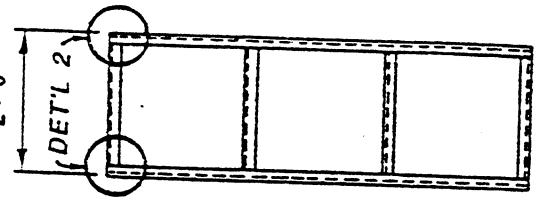
Figure 6

MATERIAL  
STL L's 2" x 2" x 1/4"

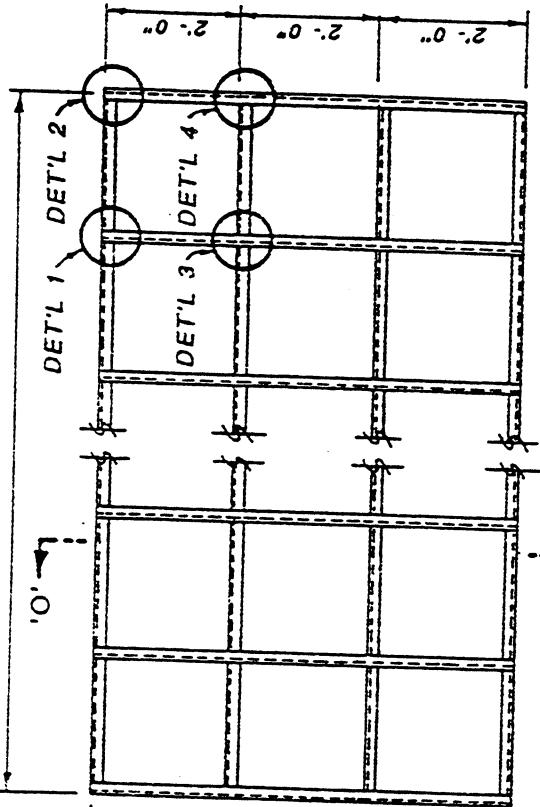


REQ'D TYPE

		<u>TOP VIEW</u>	<u>WIDTH</u>
1	W1	0 BAYS @ 2'-0" c/c = 16'-0"	4'-0"
2	W2	6 BAYS @ 2'-0" c/c = 12'-0"	2'-0"
2	W3	4 BAYS @ 2'-0" c/c = 8'-0"	2'-0"
2	W4	4 BAYS @ 2'-0" c/c = 8'-0"	2'-0"
1	W5	14 BAYS @ 2'-0" c/c = 28'-0"	2'-0"



SIDE VIEW



FRONT VIEW

TYP. WALL FRAME

SECTION '0-0'

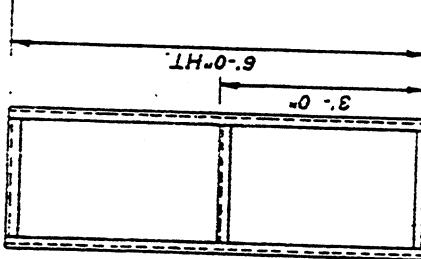
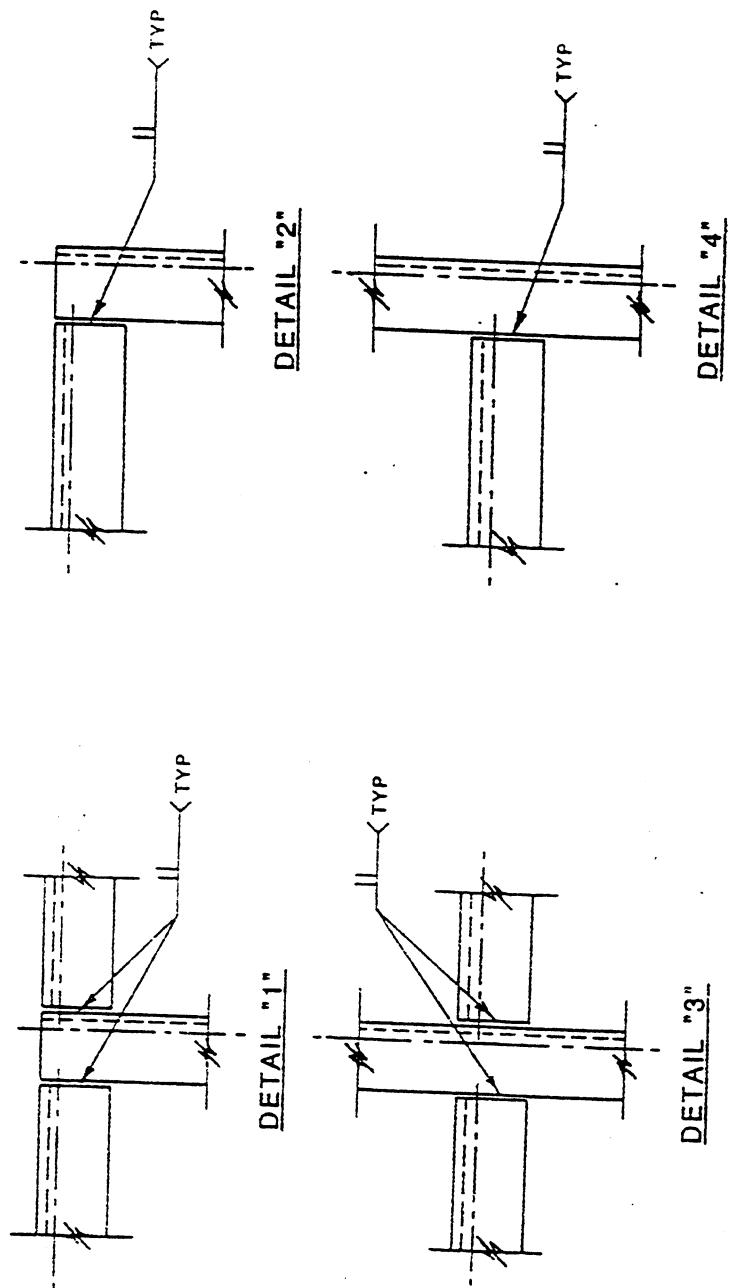


Fig 7

Figure 8



TYP. CROSS-BRACING AND CORRUGATED STEEL  
ATTACHMENT DETAIL  
OPTION 1

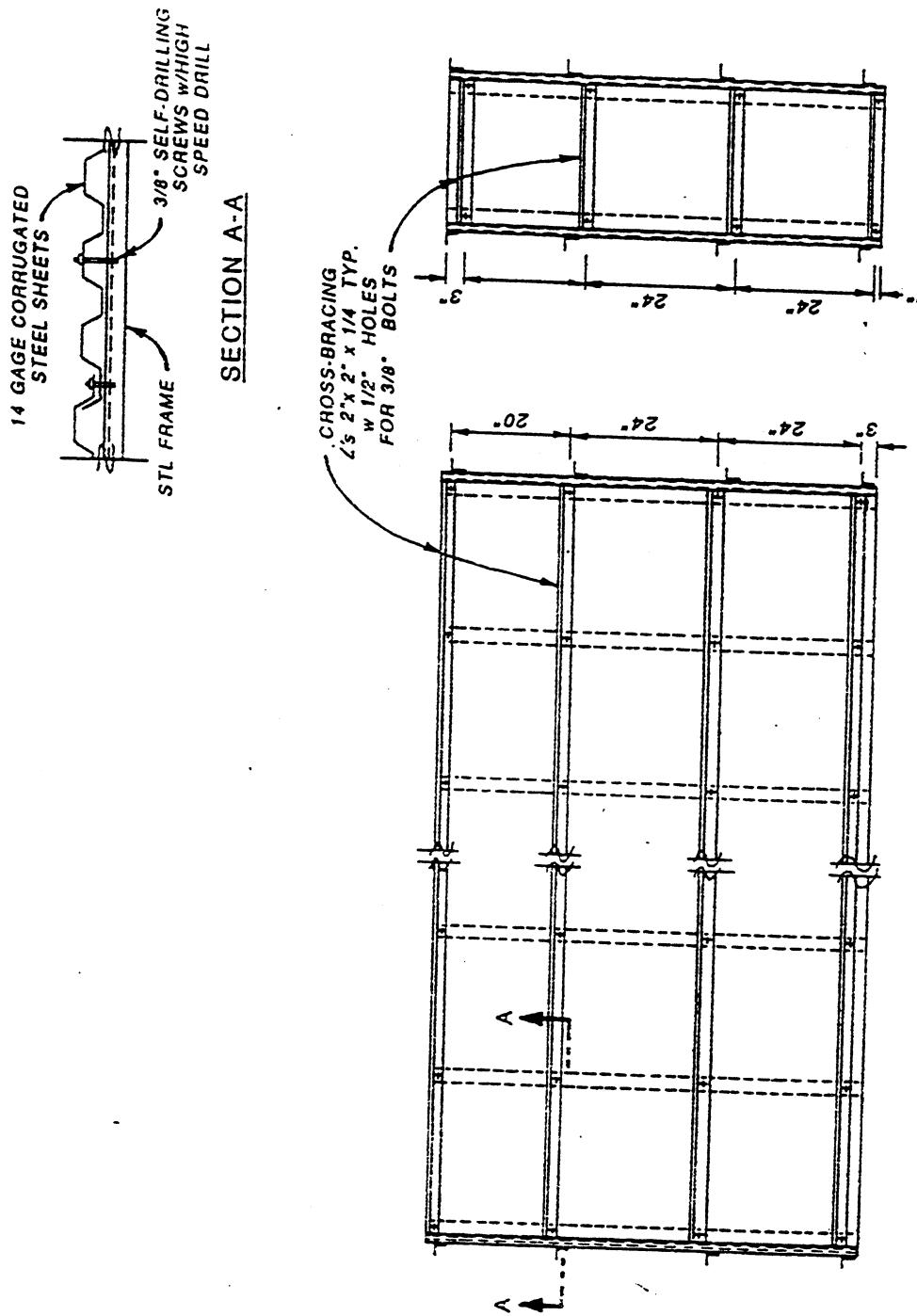


Fig. 9

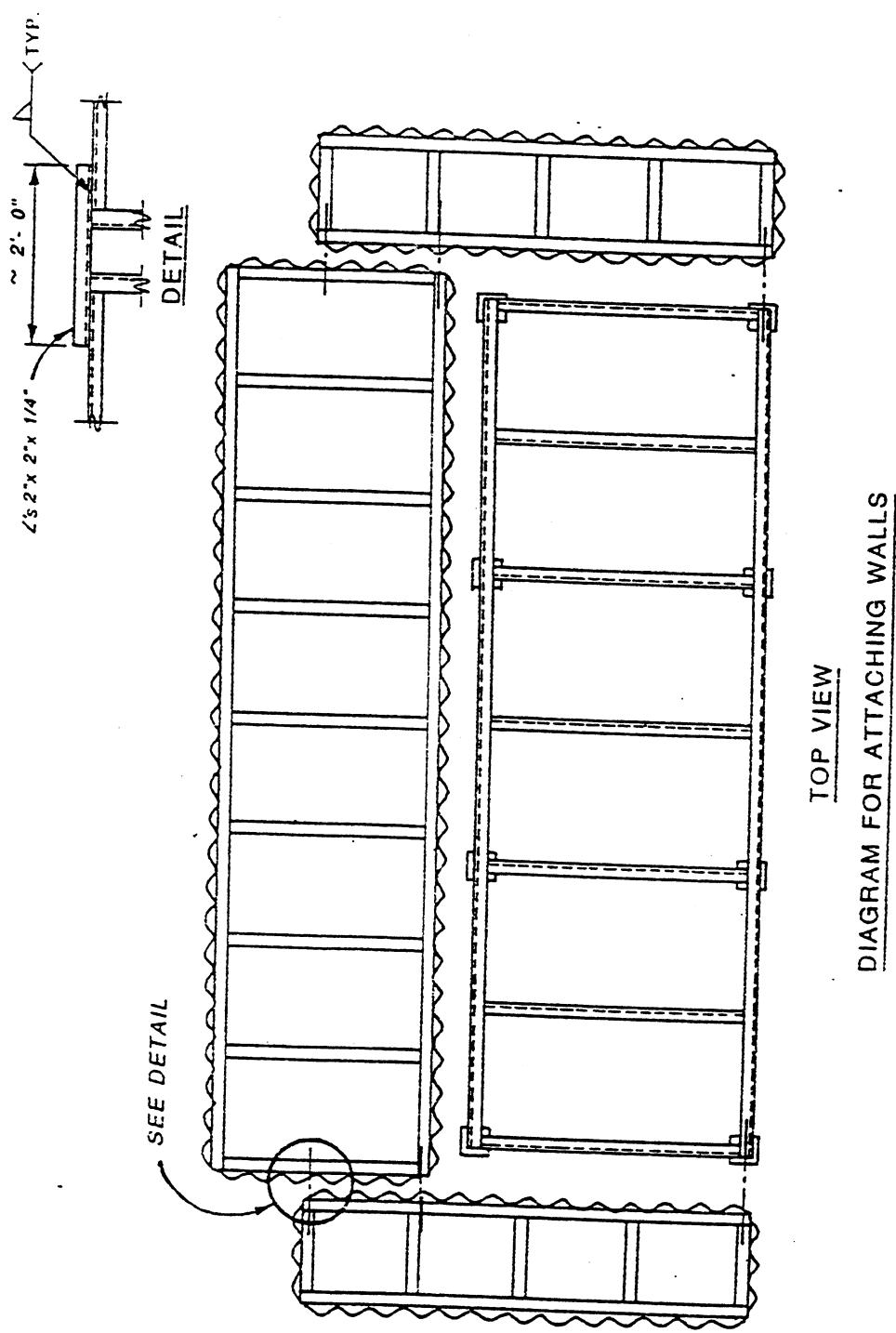
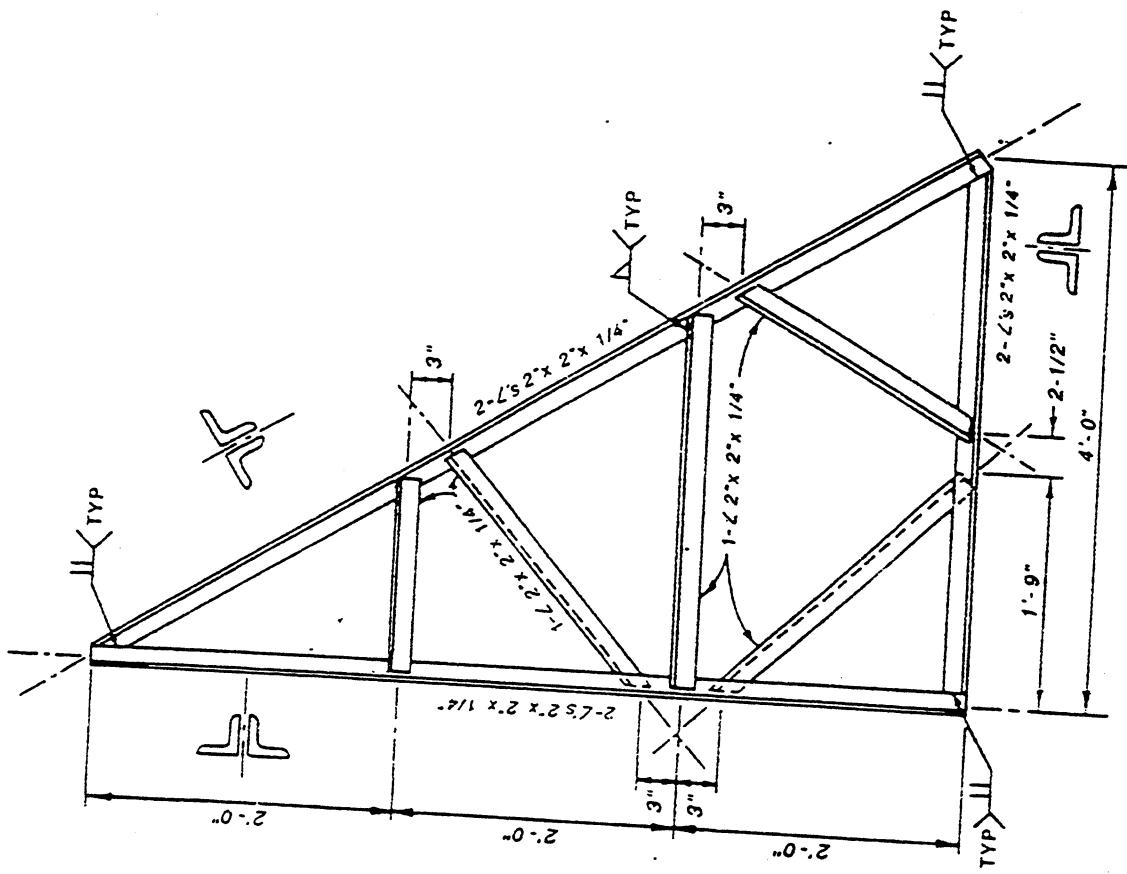


Figure 10



TYP STL FRAME FOR WALL BRACING  
OPTION A

Figure 11

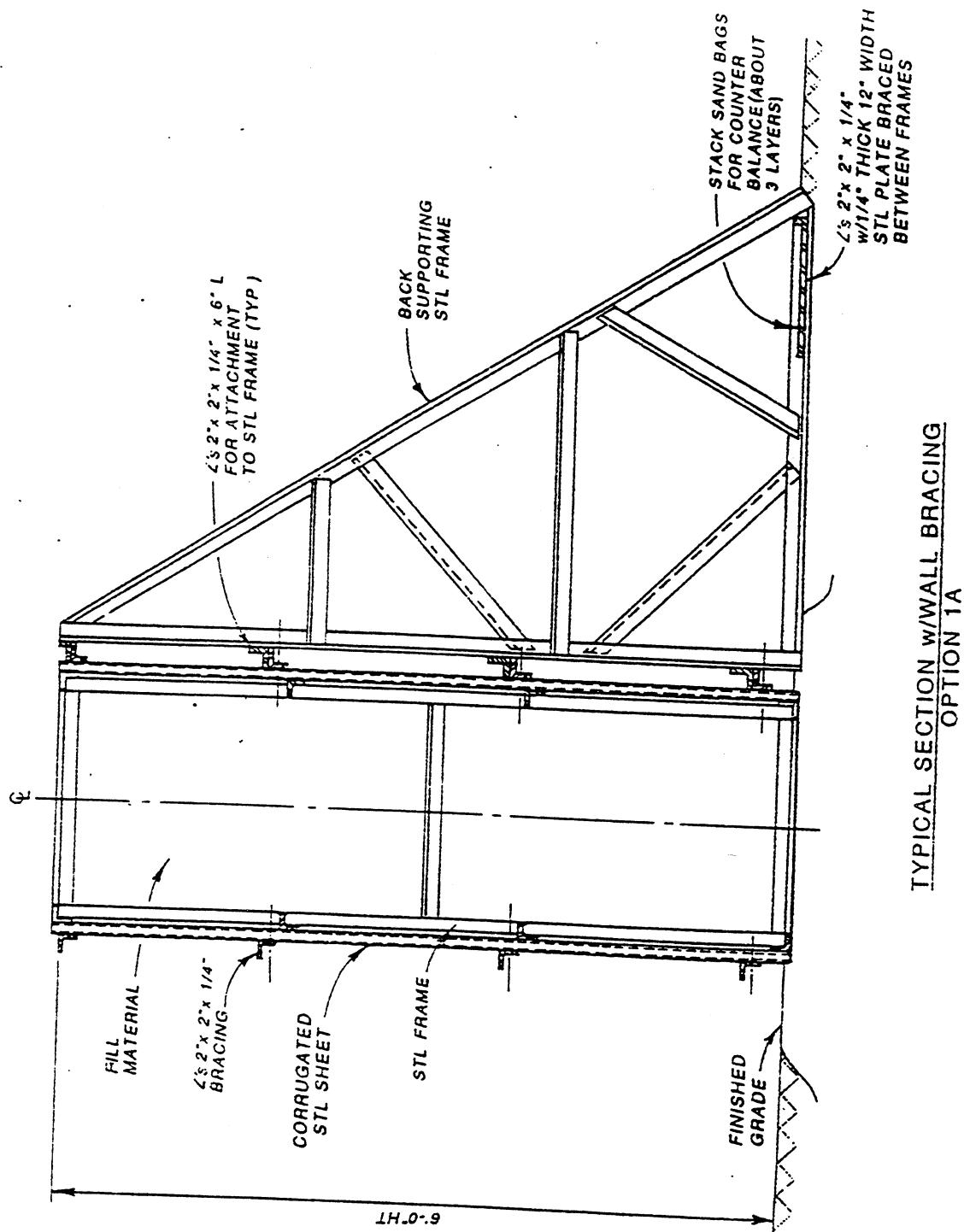
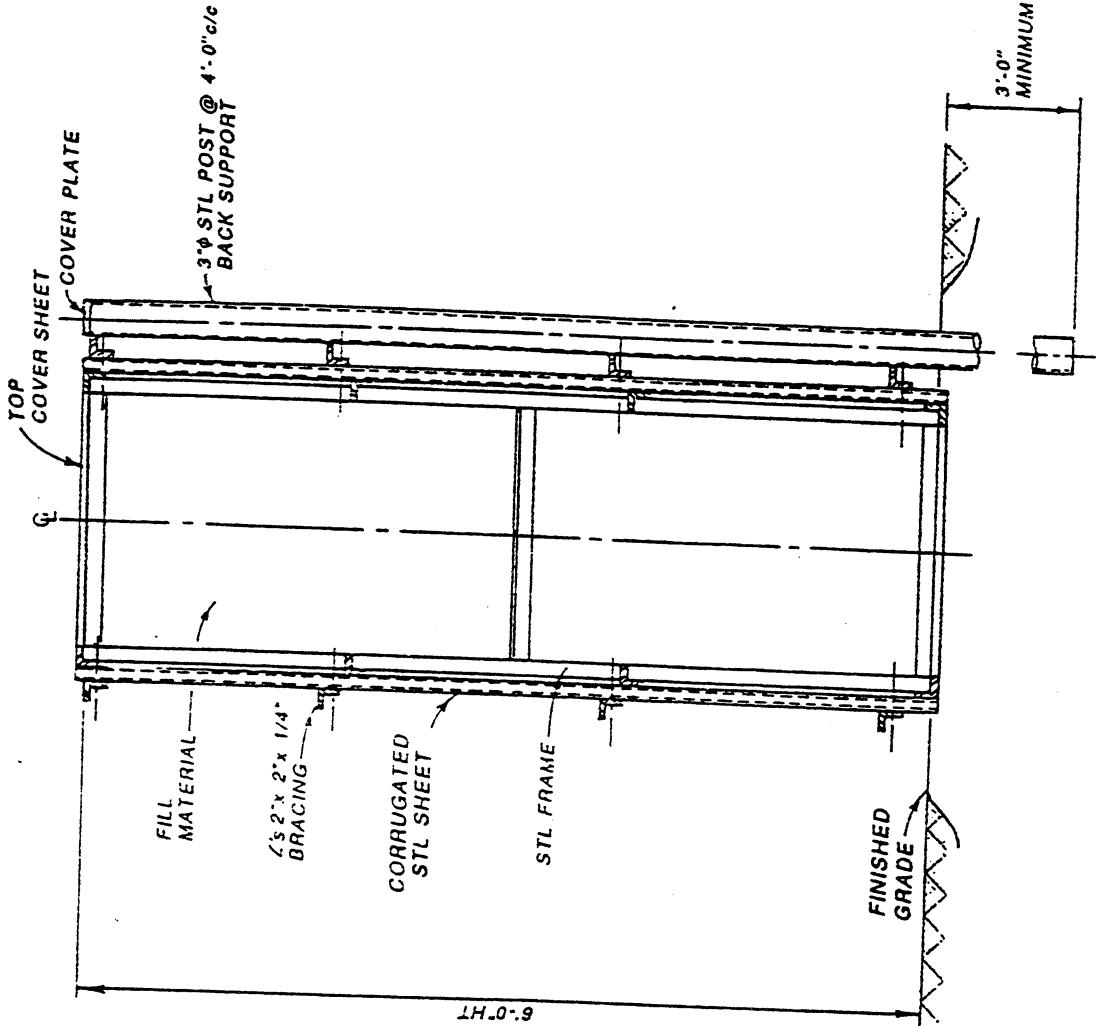


Figure 12



TYPICAL SECTION W/WALL BRACING  
OPTION 1B

Figure 13

TYPICAL SECTION w/WALL BRACING  
OPTION 1C

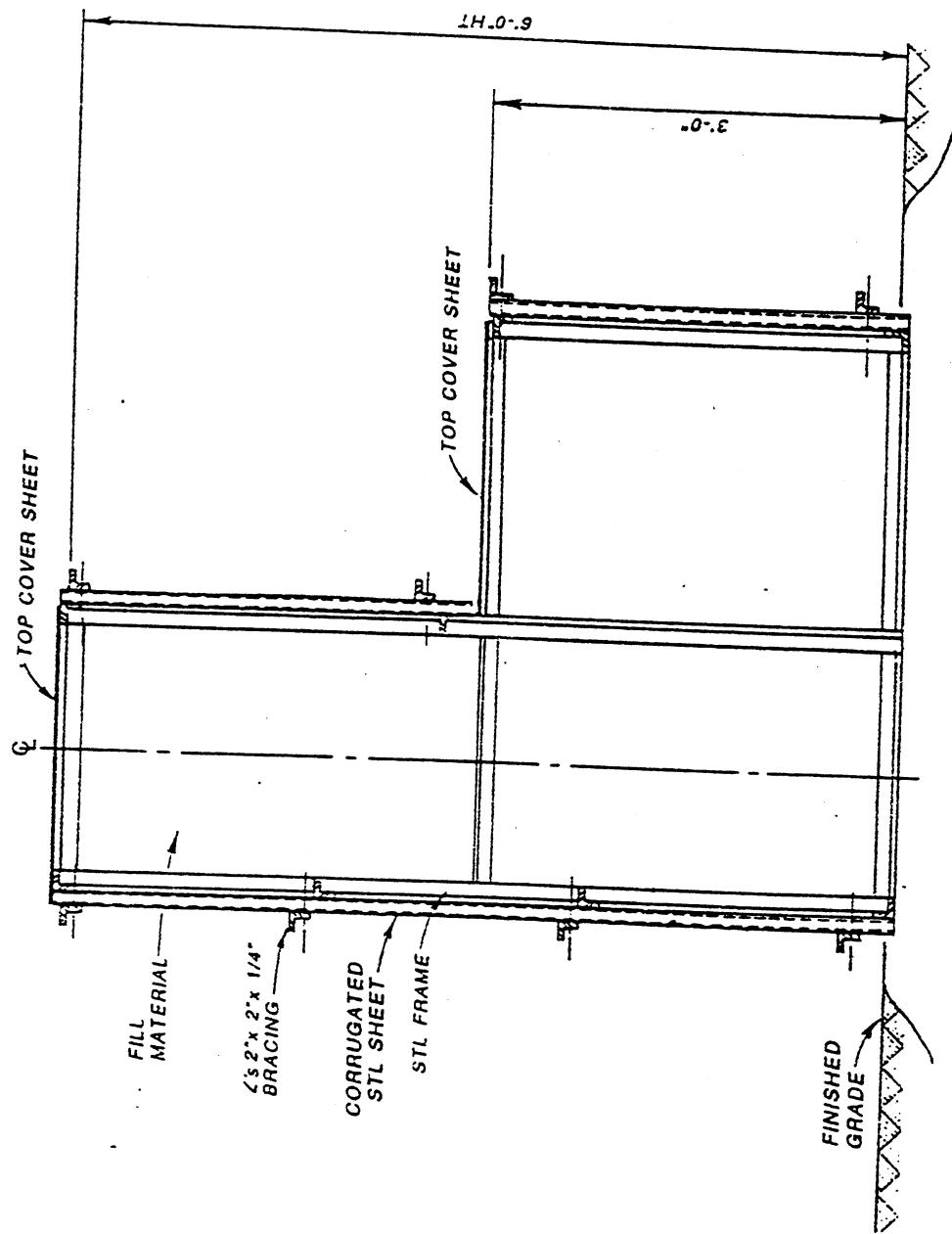


Figure 14

120mm AMMO STORAGE FACILITY  
OPTION 2A  
STEEL PIPE WALL FRAMES  
W/TRIANGULAR FRAME WALL BRACES

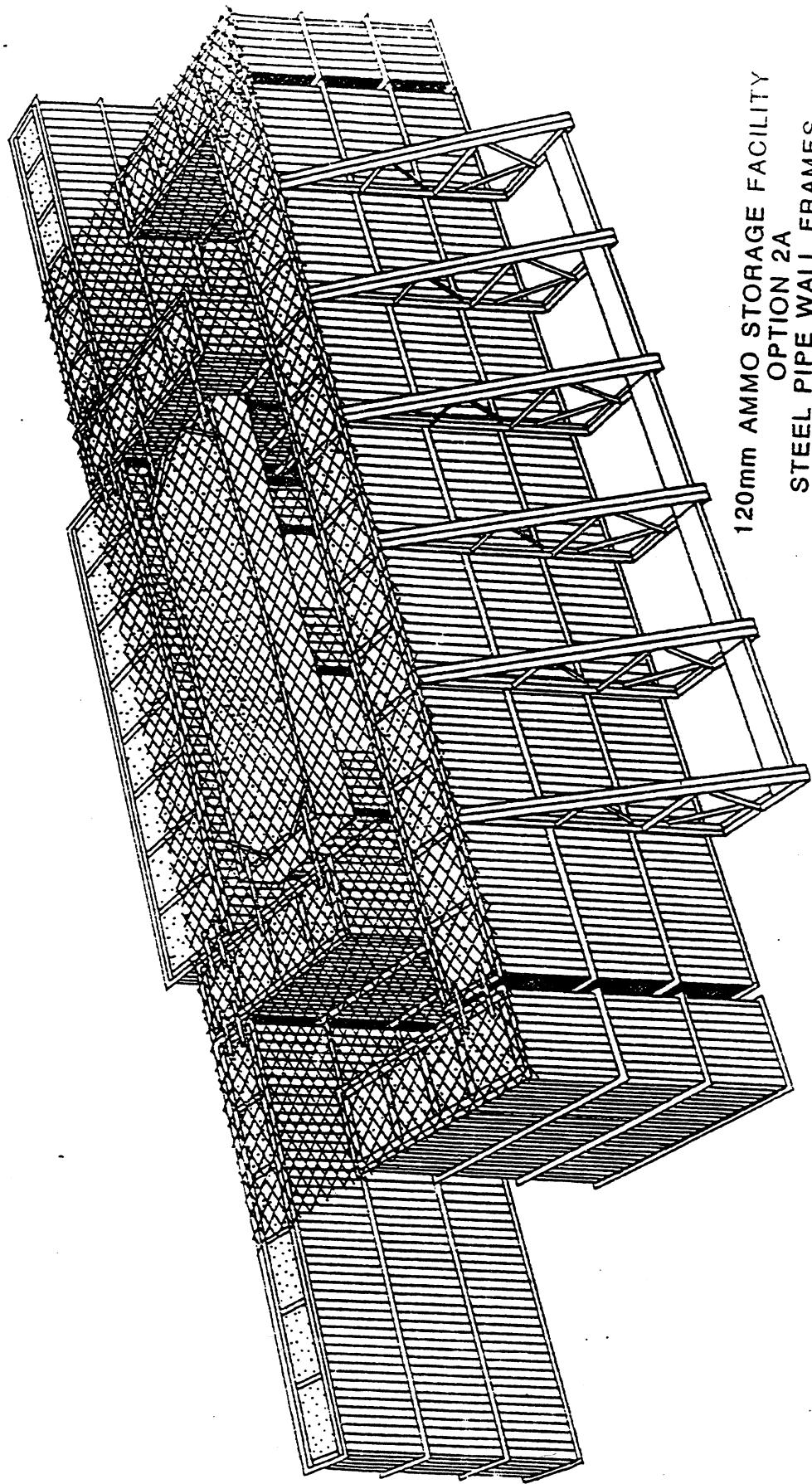


Figure 15

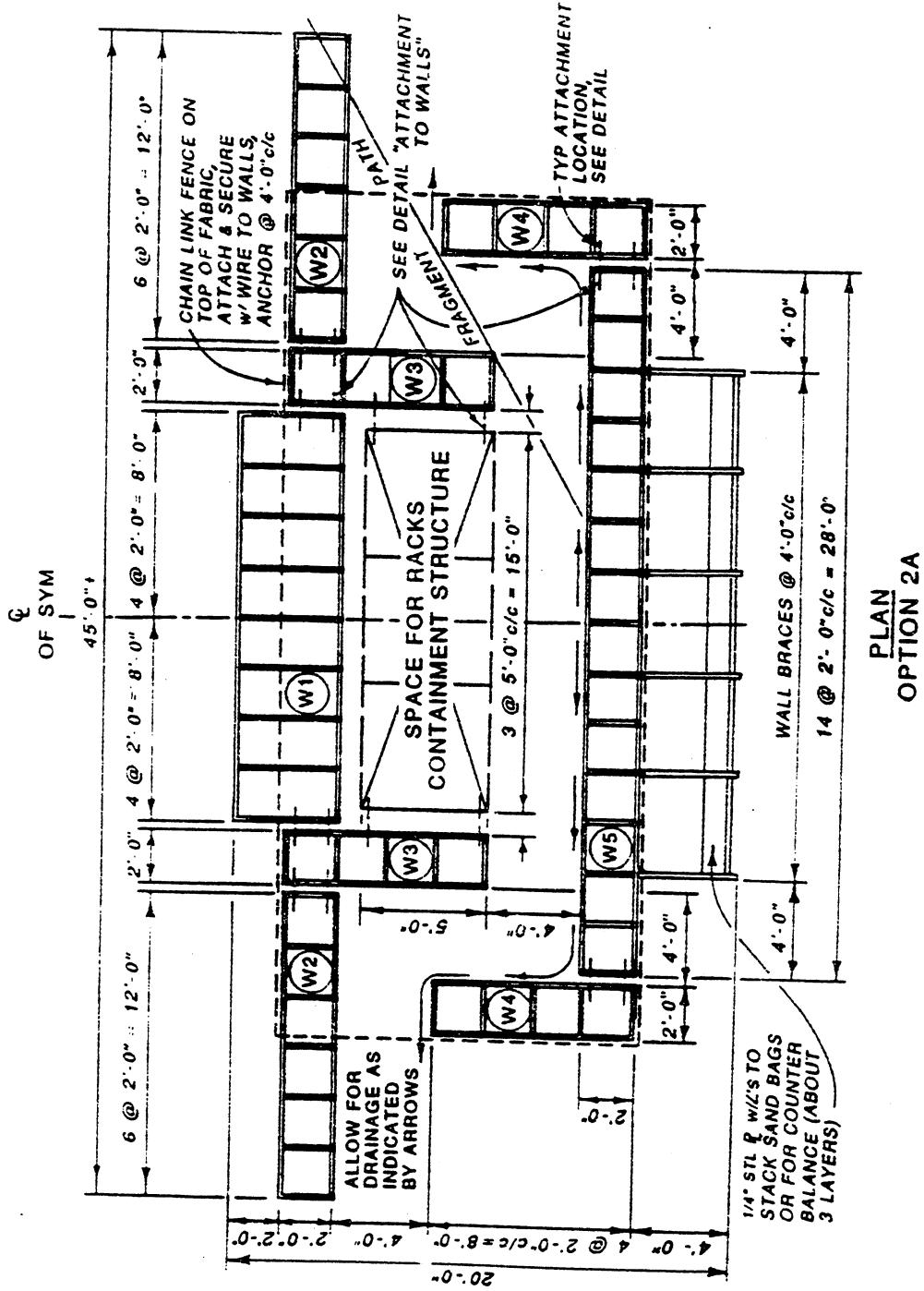


Figure 16

120mm AMMO STORAGE FACILITY  
OPTION 2B  
STEEL PIPE WALL FRAMES  
w/STEEL PIPE WALL BRACES

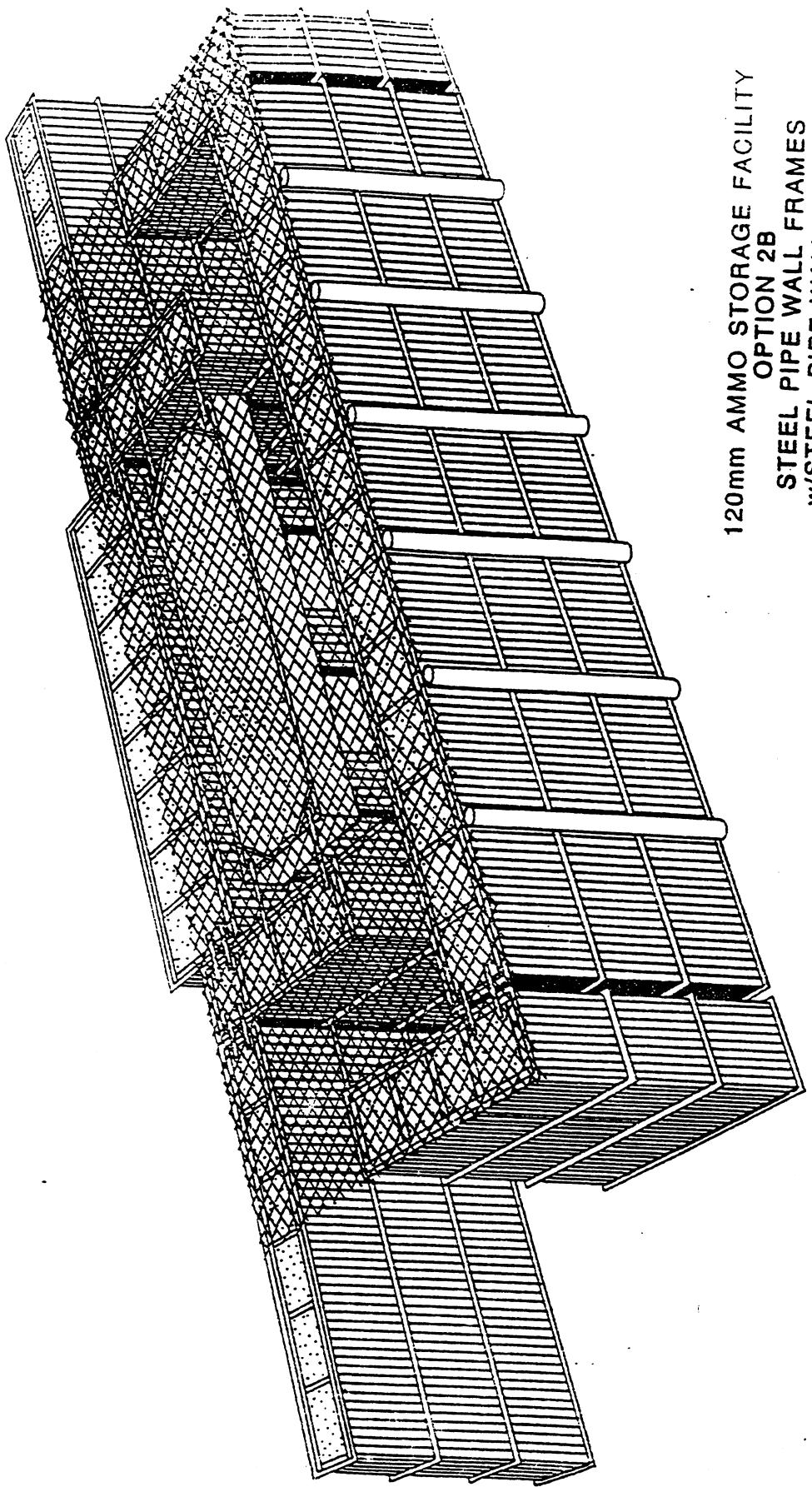


Figure 17

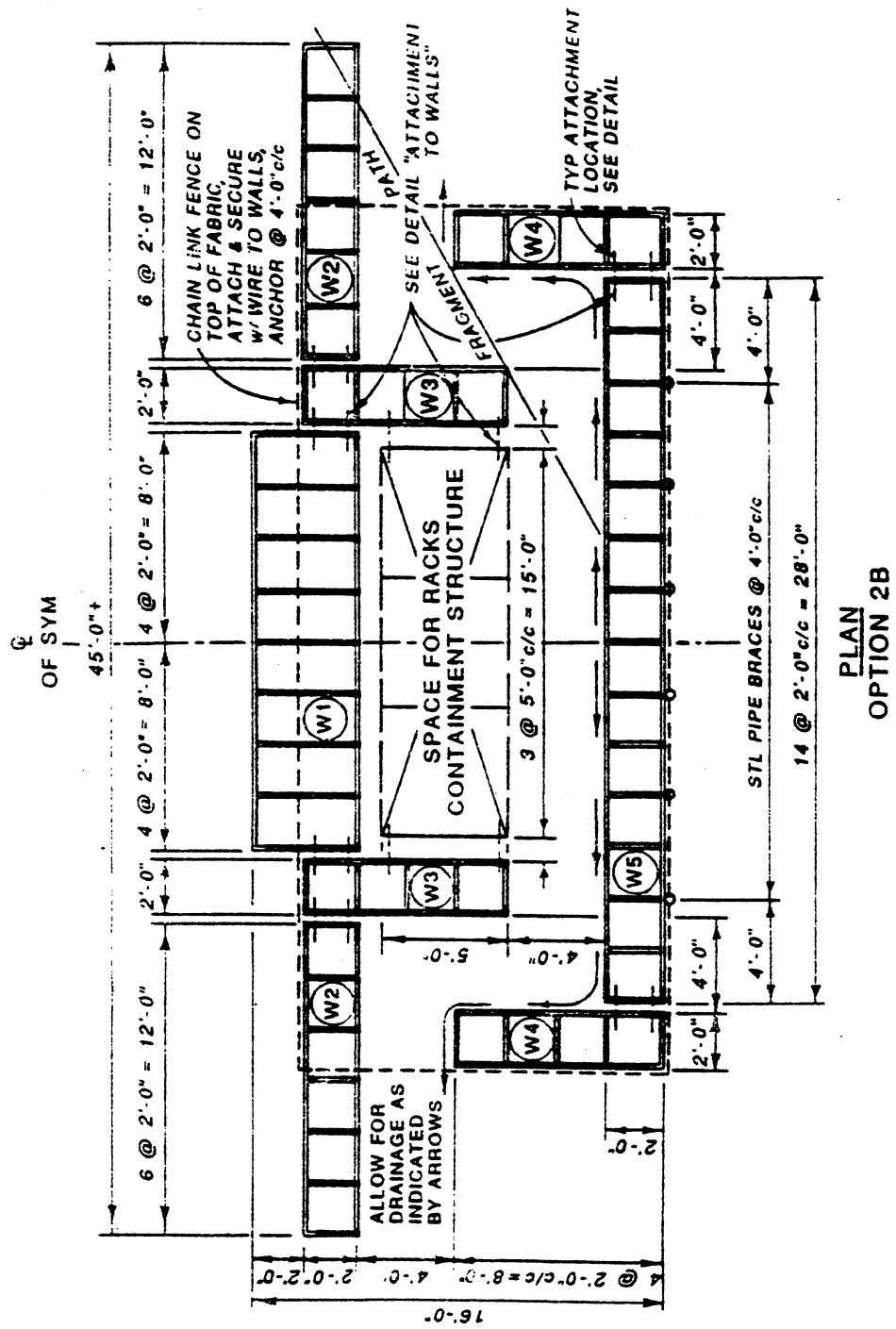


Figure 18

120mm AMMO STORAGE FACILITY  
OPTION 2C  
STEEL PIPE WALL FRAMES  
w/HALF-HEIGHT WALLS

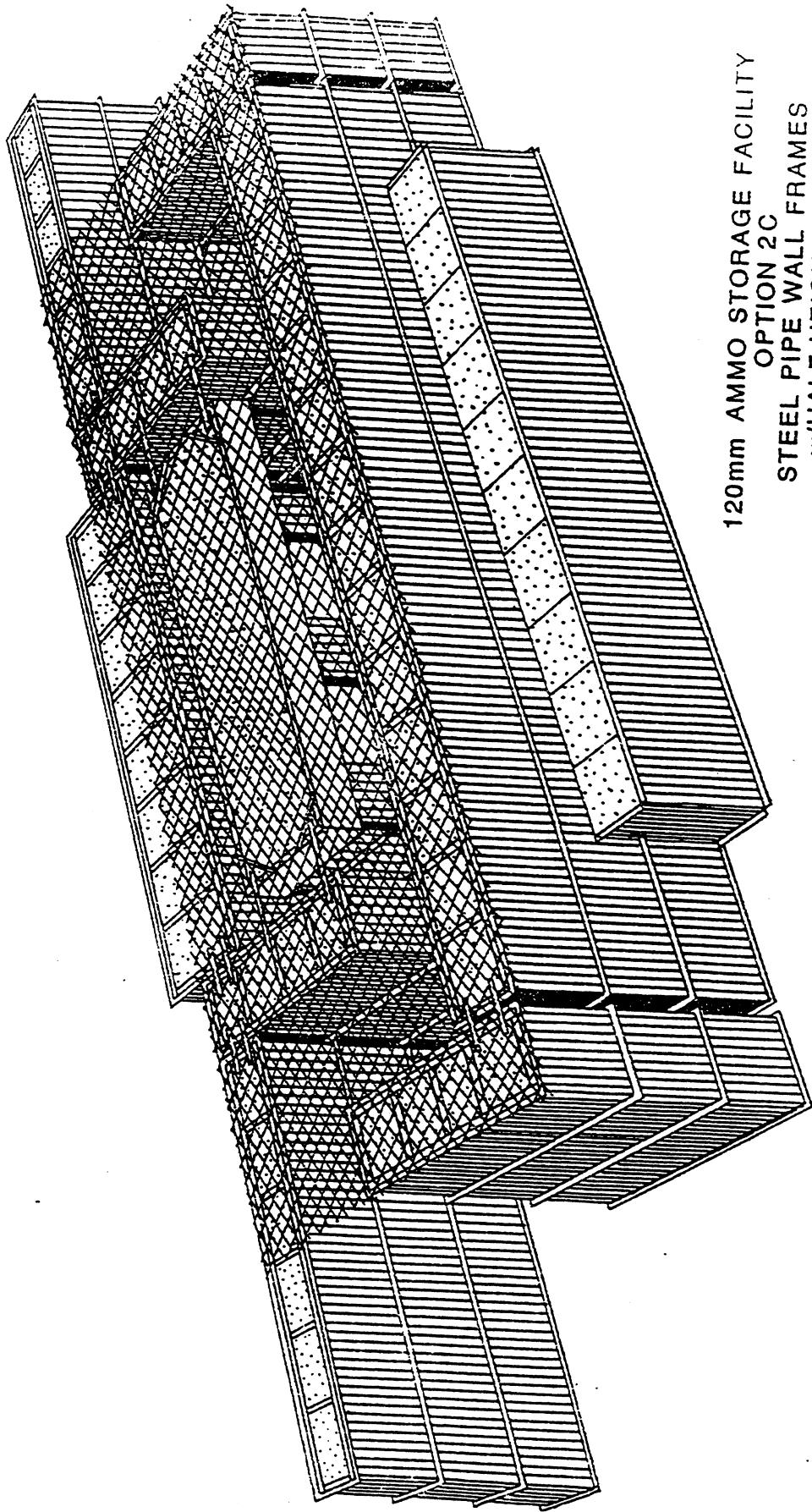


Figure 19

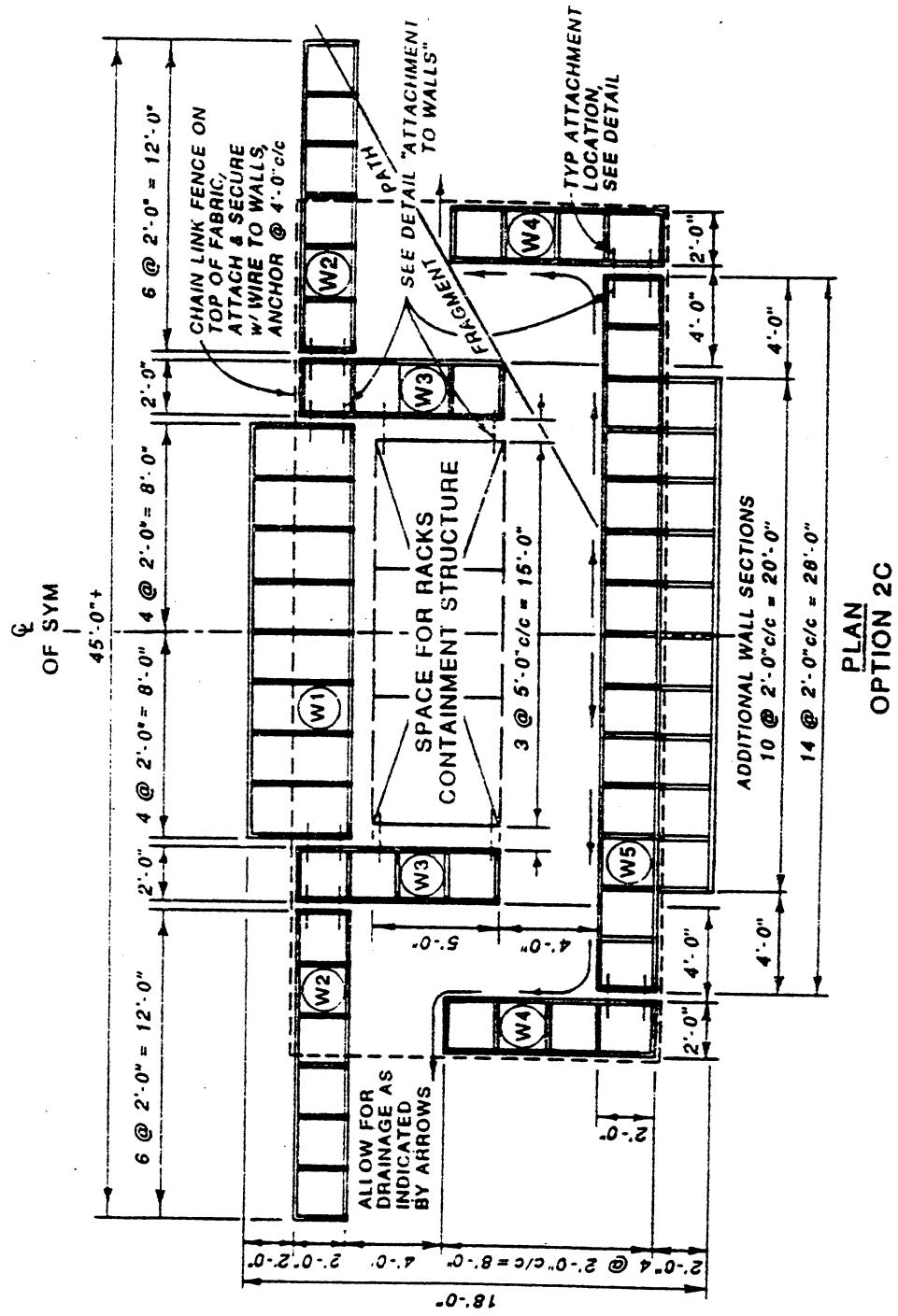
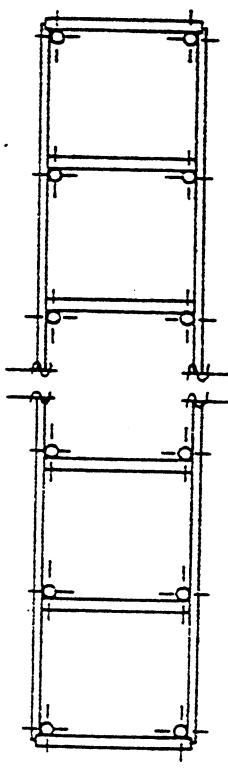


Figure 20



MATERIAL  
STL LS 1-1/2"

TYPICAL CONNECTIONS  
SEE DETAILS

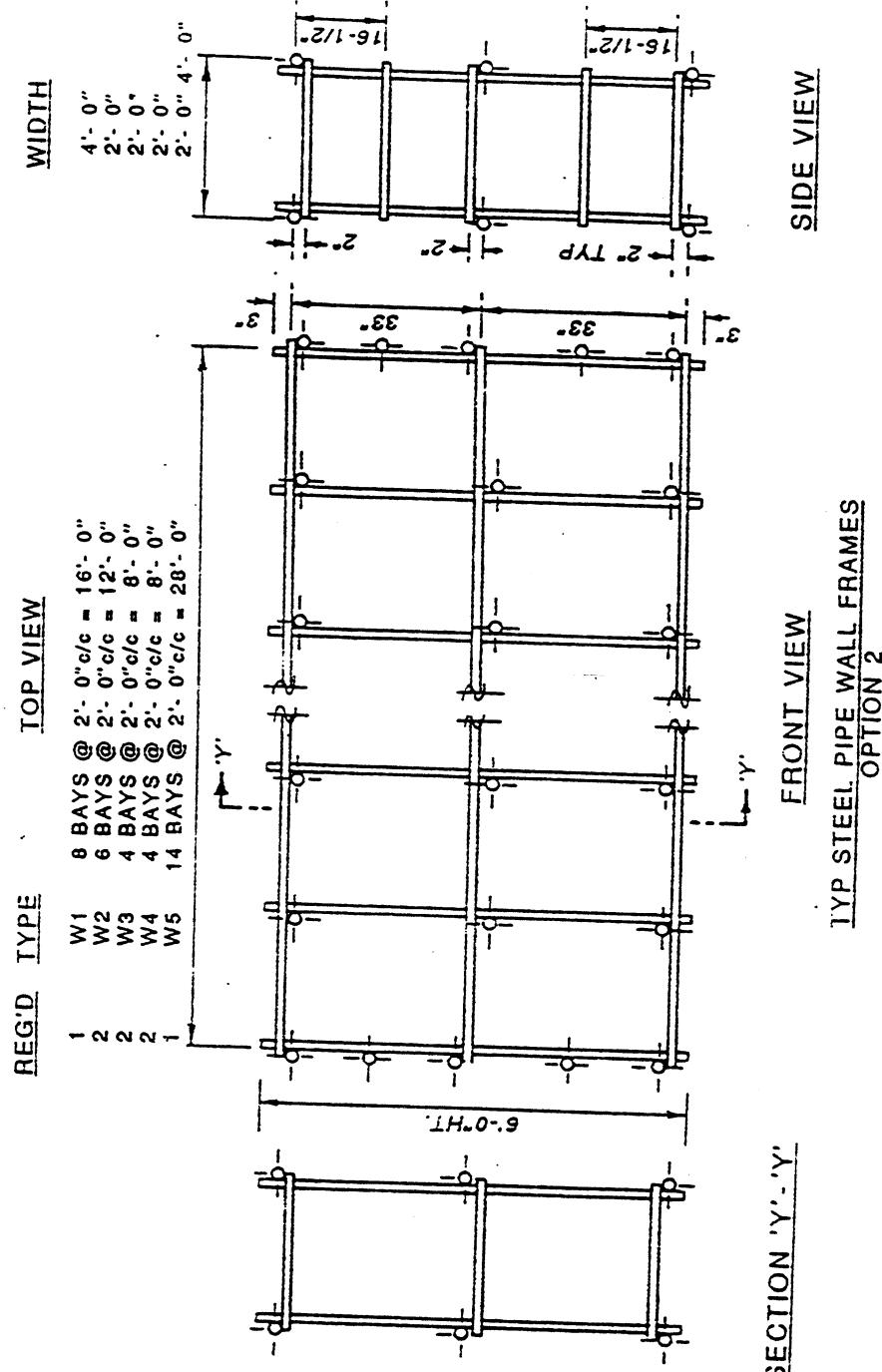
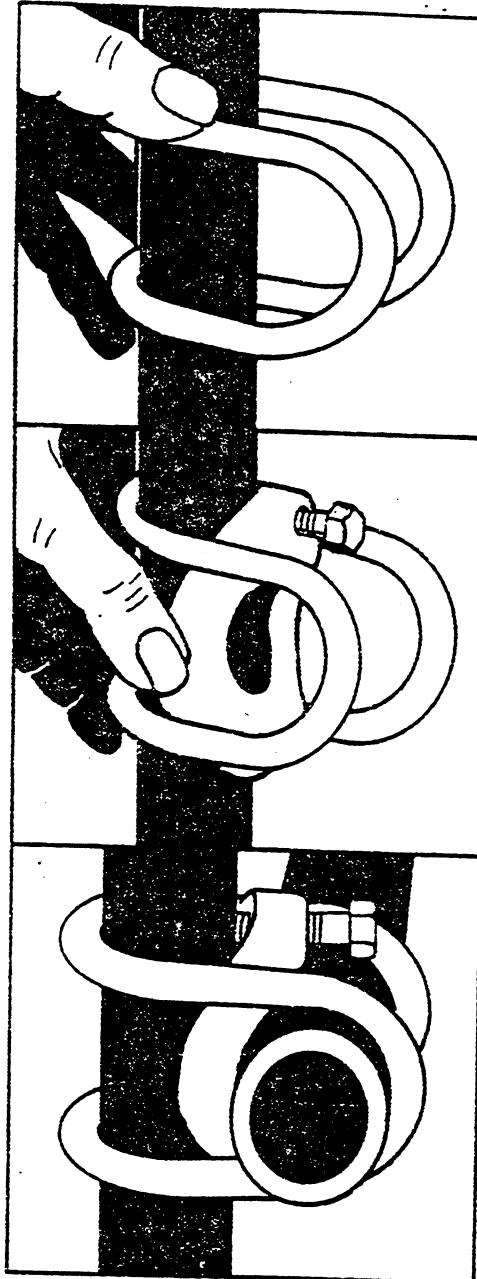


Figure 21



SLIDE OPEN  
LOOP OVER  
PIPE.

INSERT HI-  
STRENGTH  
SADDLE.

ADD CROSS  
PIPE AND  
TIGHTEN  
SET SCREW.

CROSS-GRIP PIPE RACK CLAMPS  
TYP PIPE CONNECTION

Figure 22

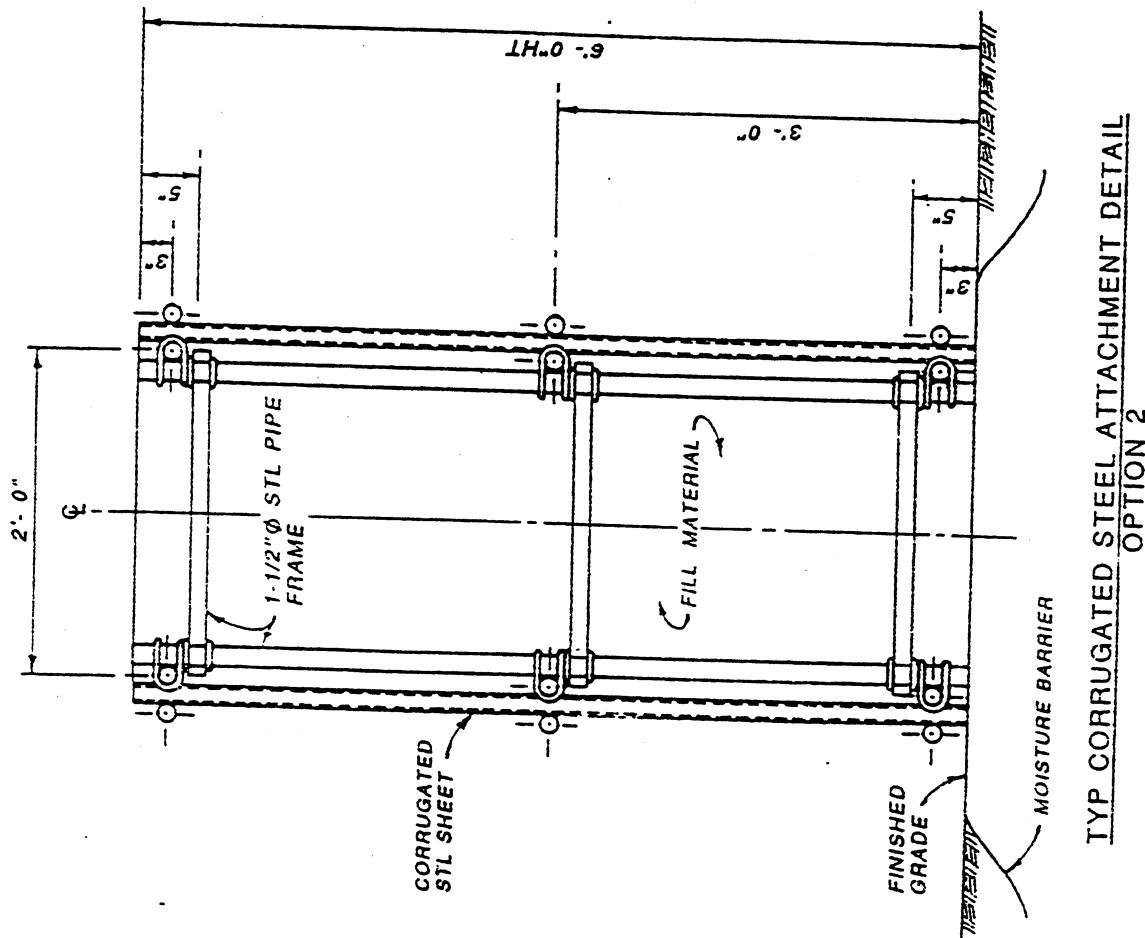
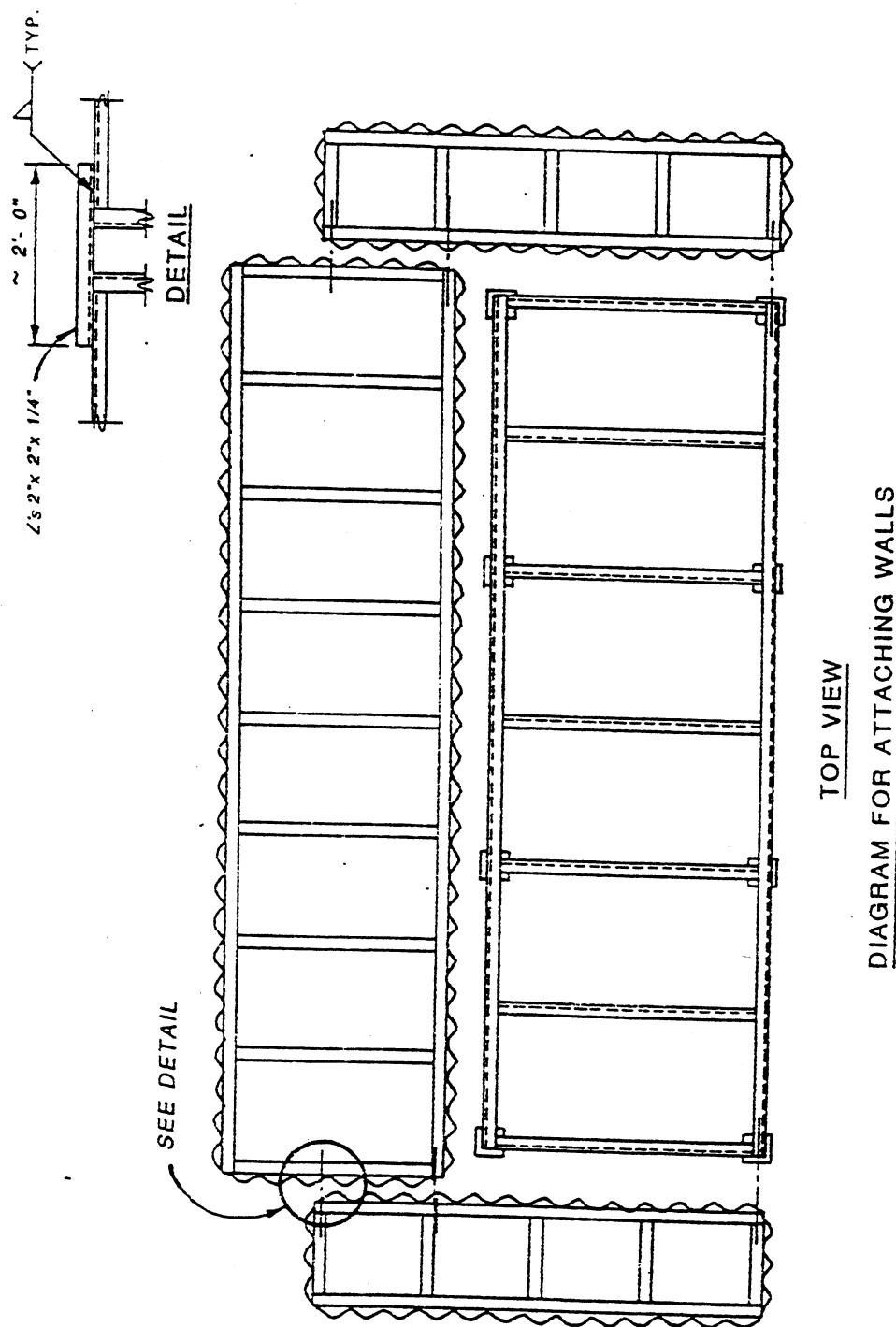
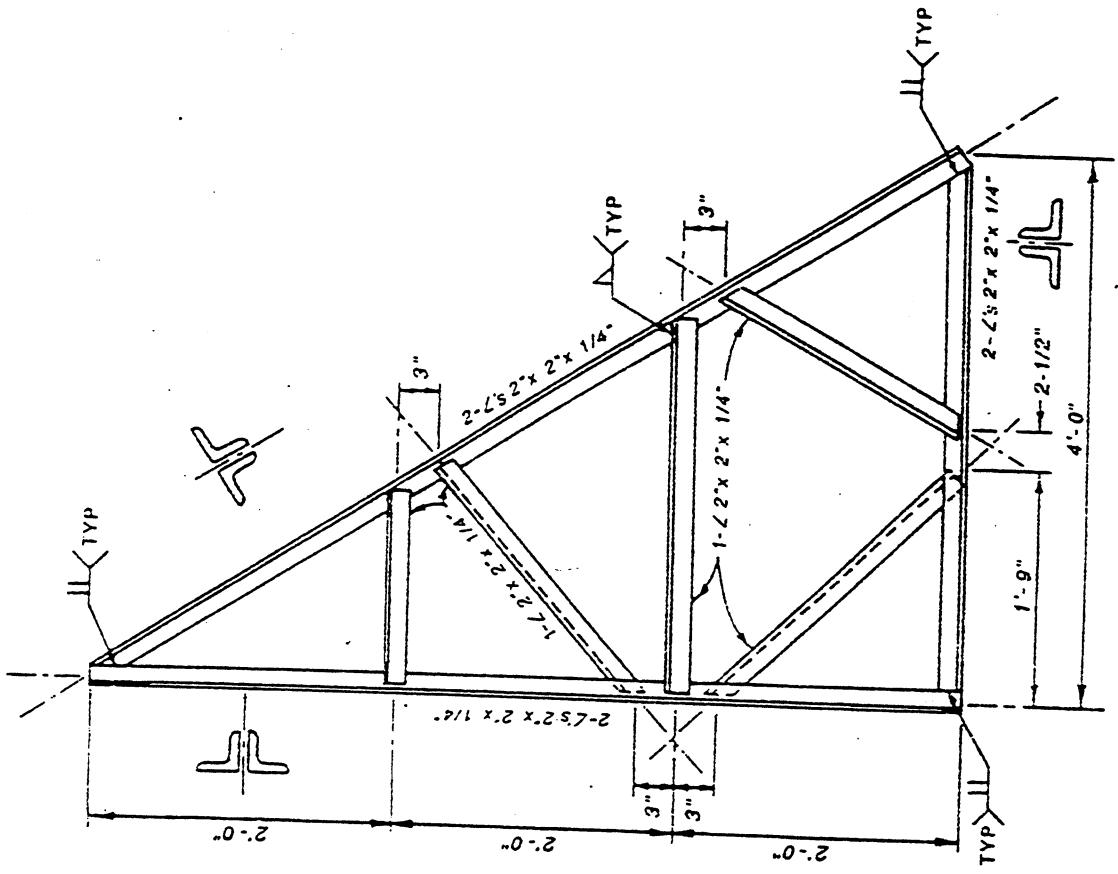


Figure 3

Figure 24





TYP STL FRAME FOR WALL BRACING  
OPTION 2A

F Jre 25

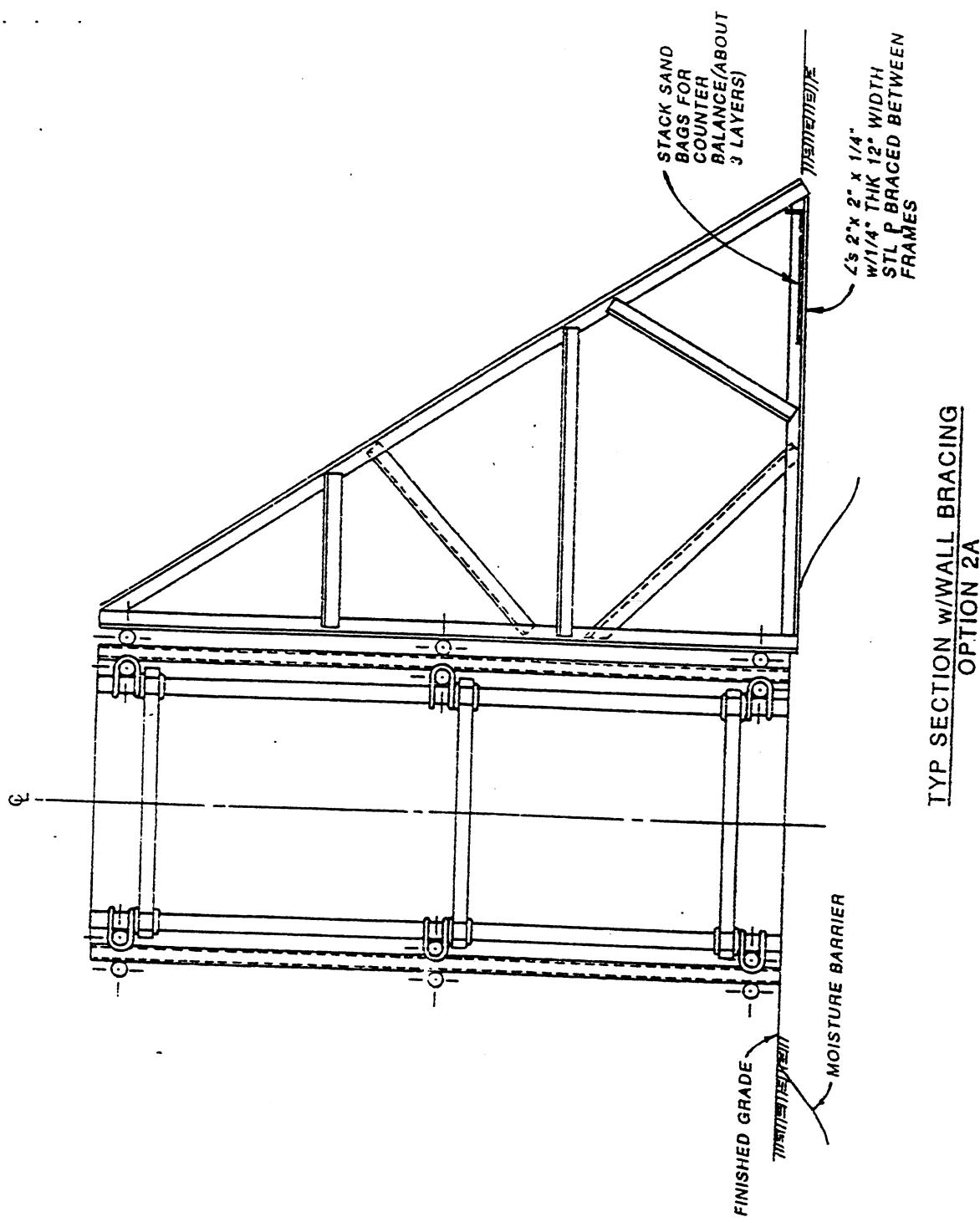
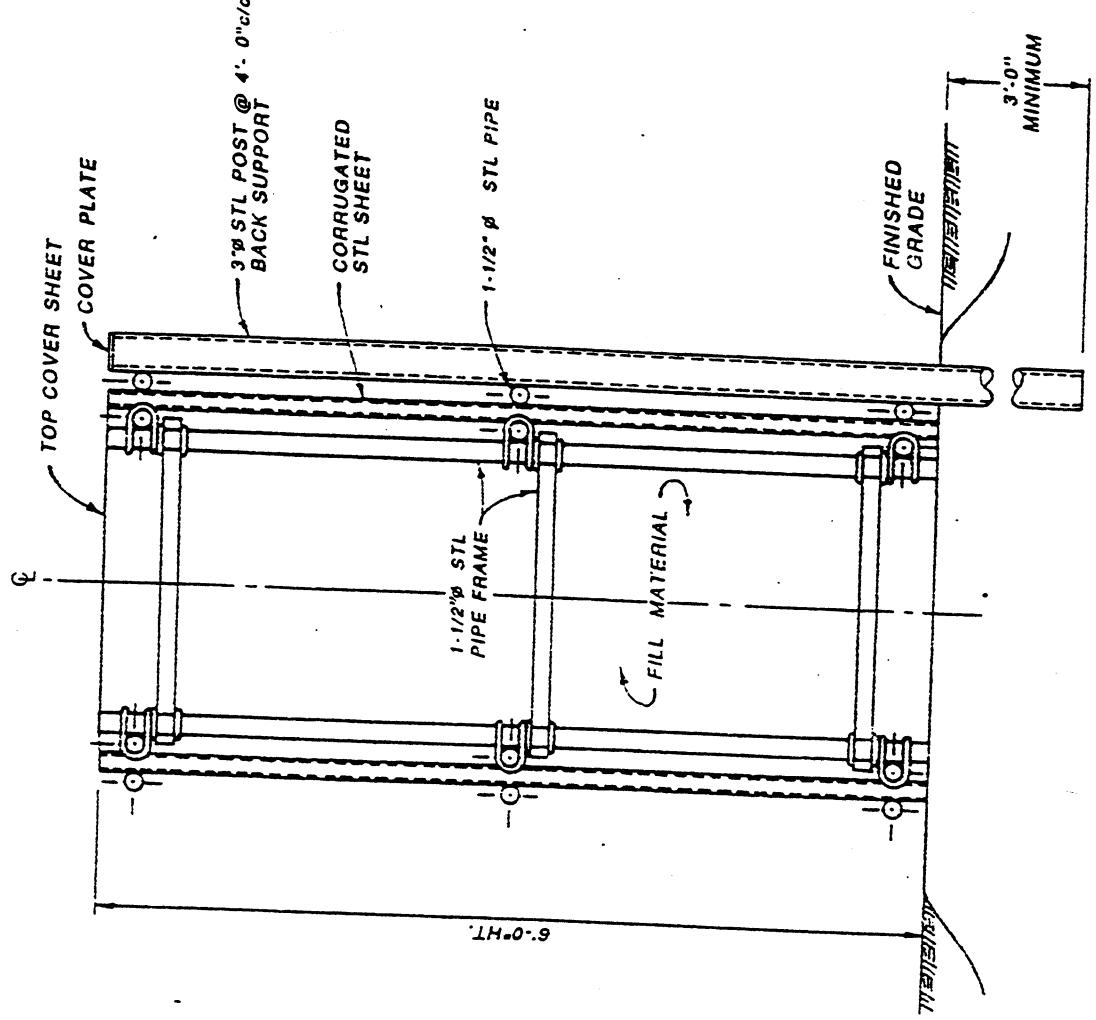


Figure 26



TYP SECTION W/WALL BRACING  
OPTION 2B

ure 27

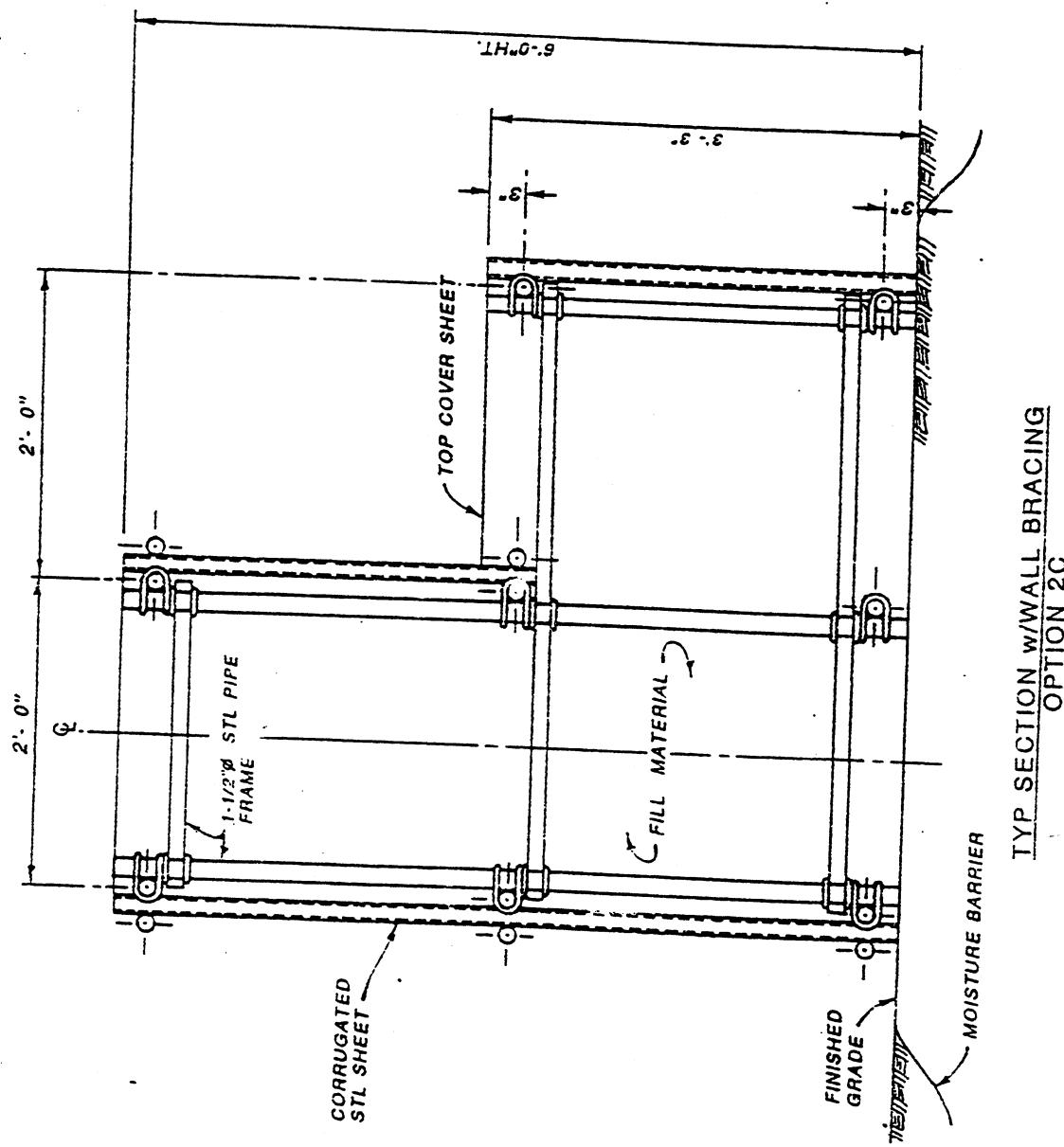


Figure 28

120mm AMMO STORAGE FACILITY  
OPTION 3  
CORRUGATED STEEL PIPE WALLS  
W/HALF-HEIGHT WALLS

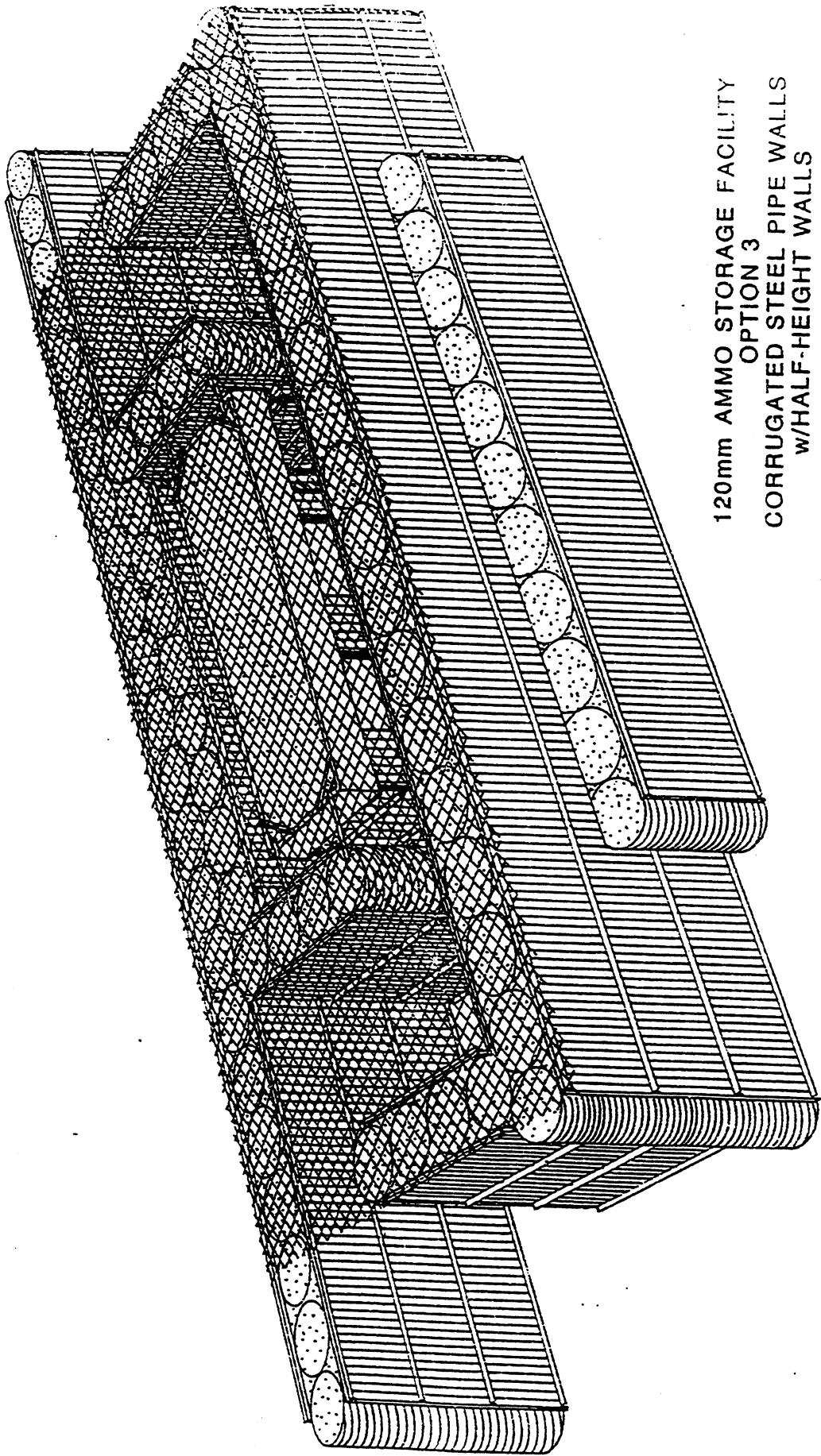


Figure 29

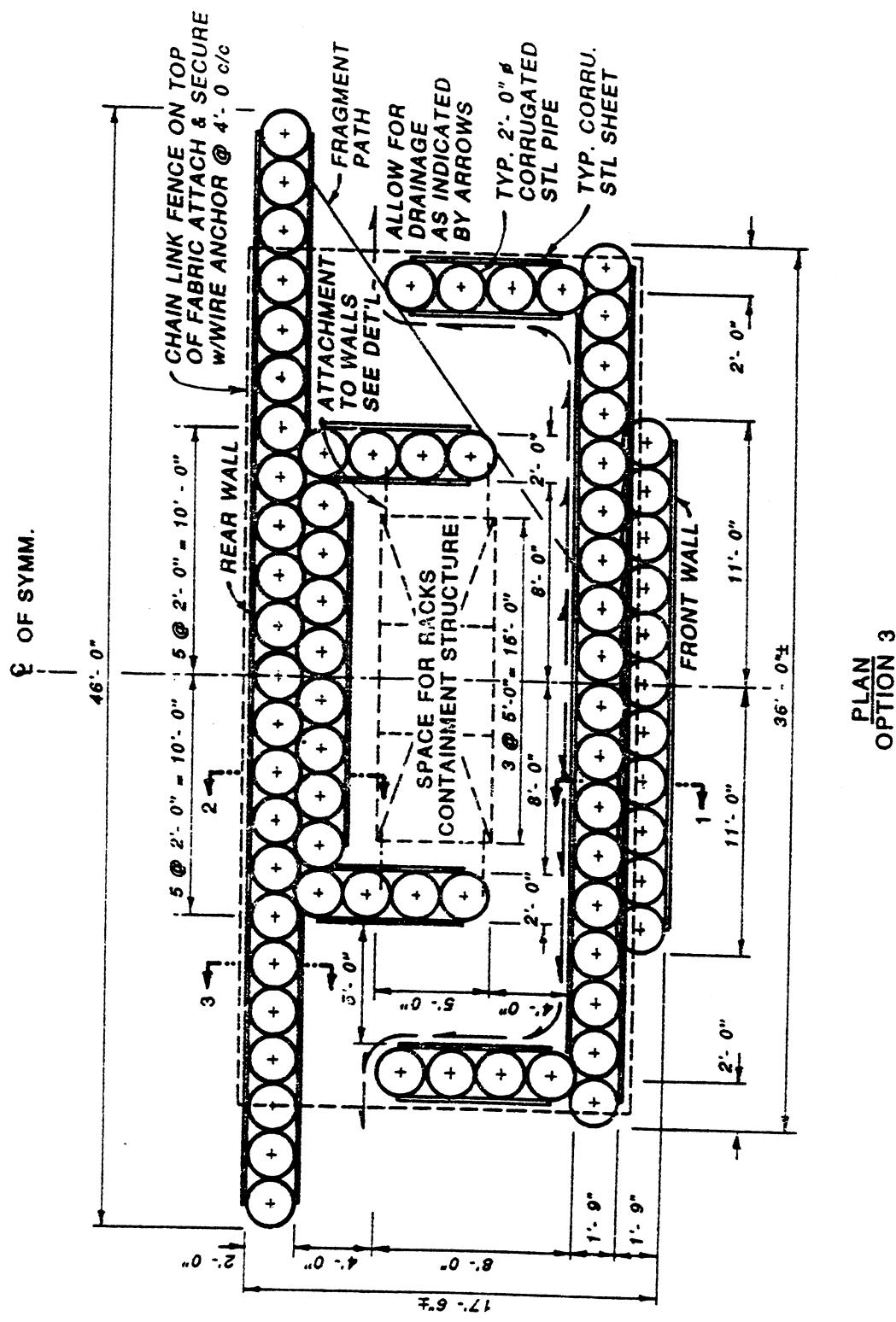


Figure 30

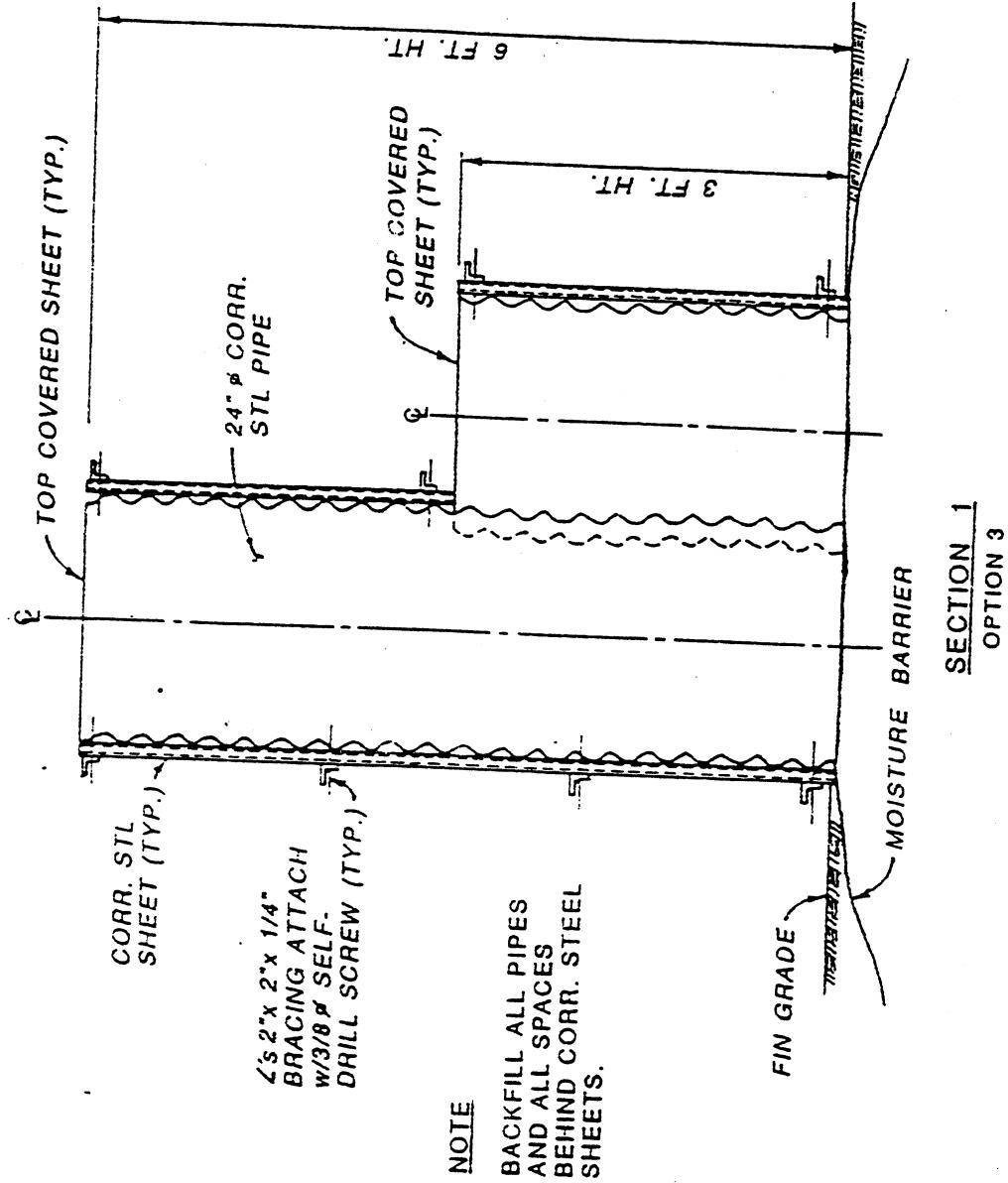


Figure 31

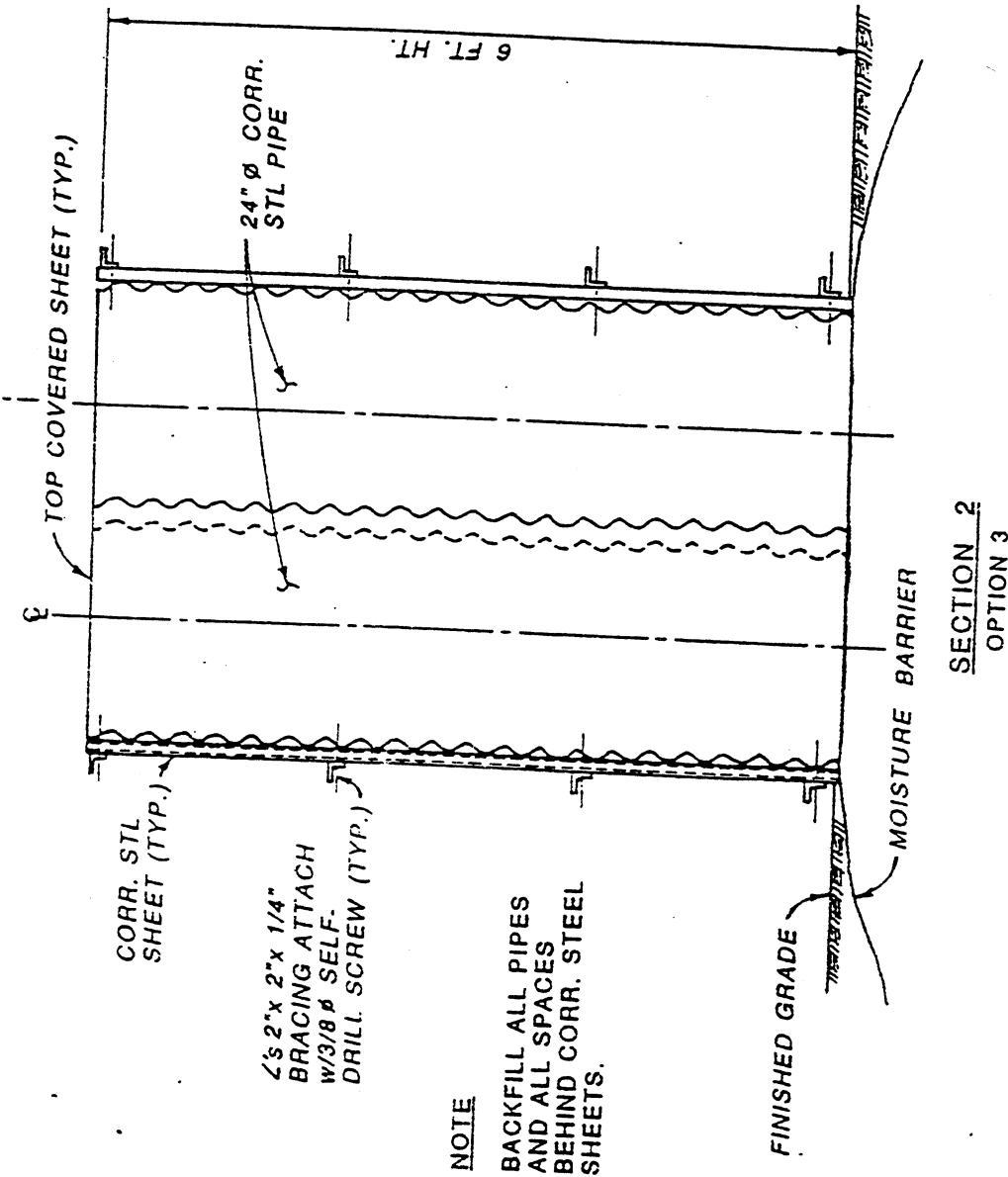


Figure 32

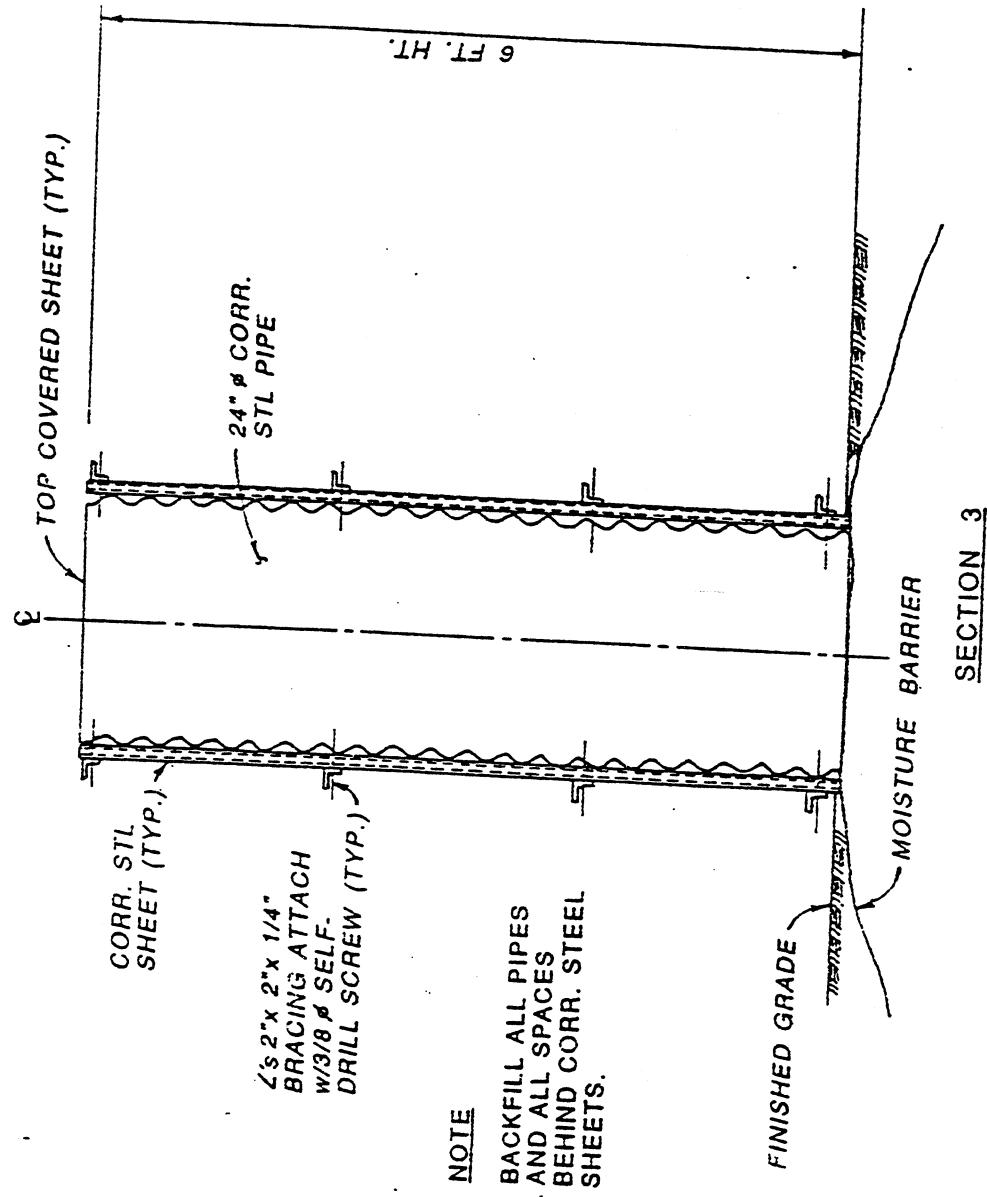


Figure 33

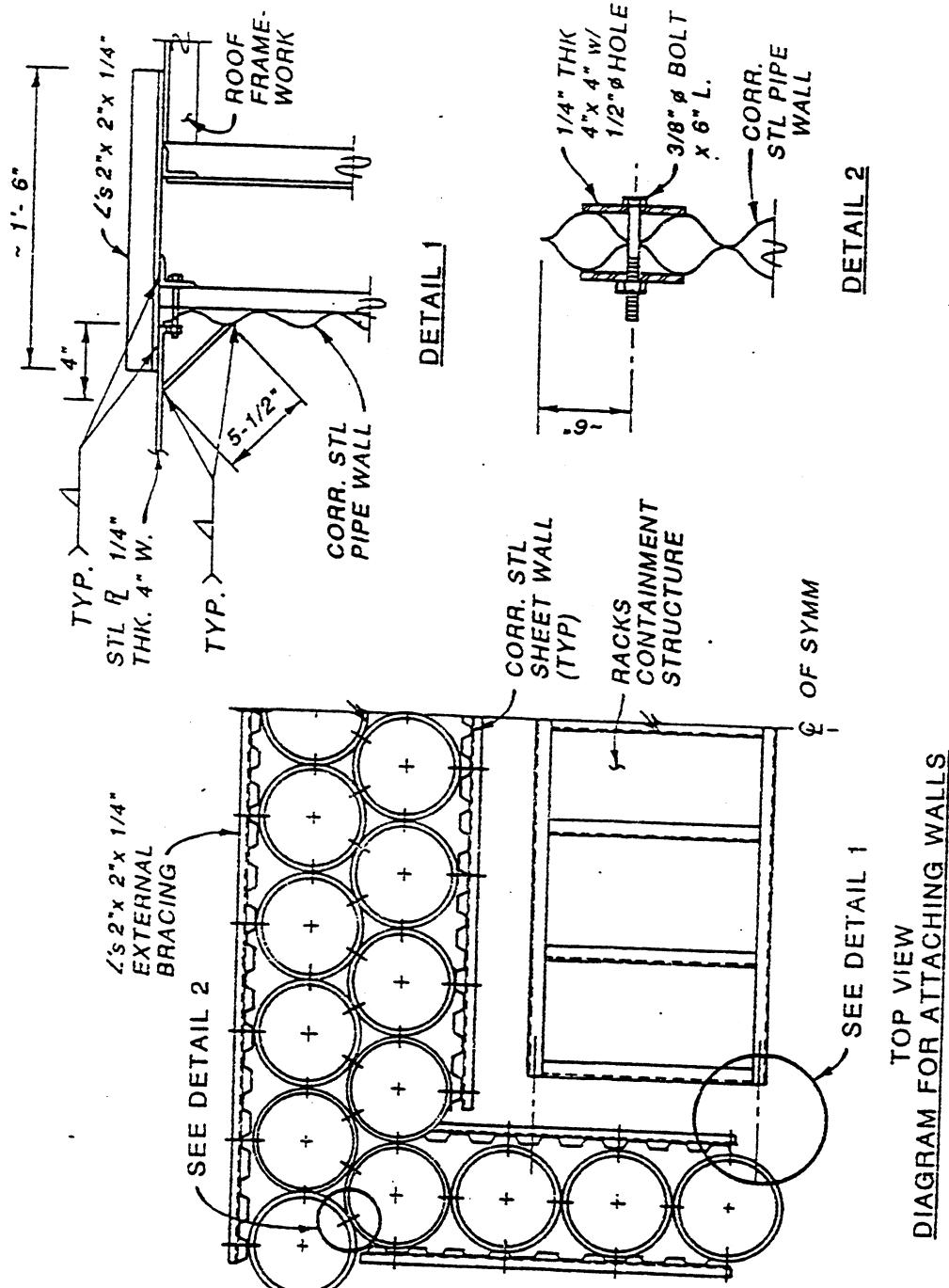
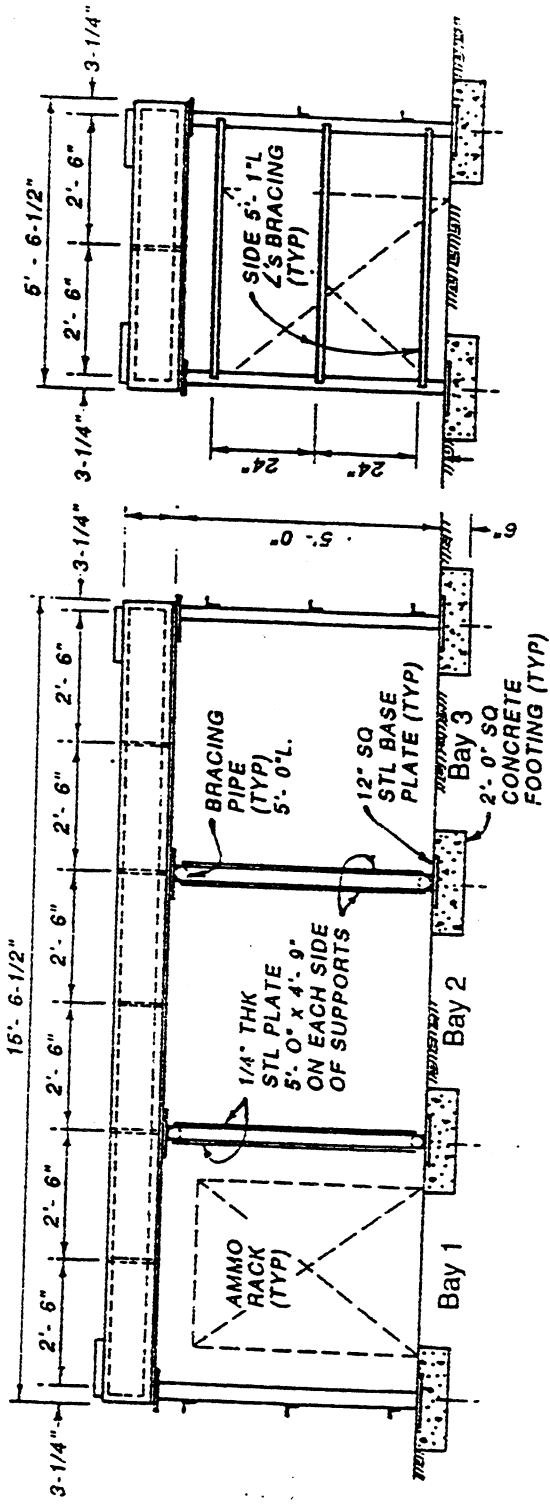
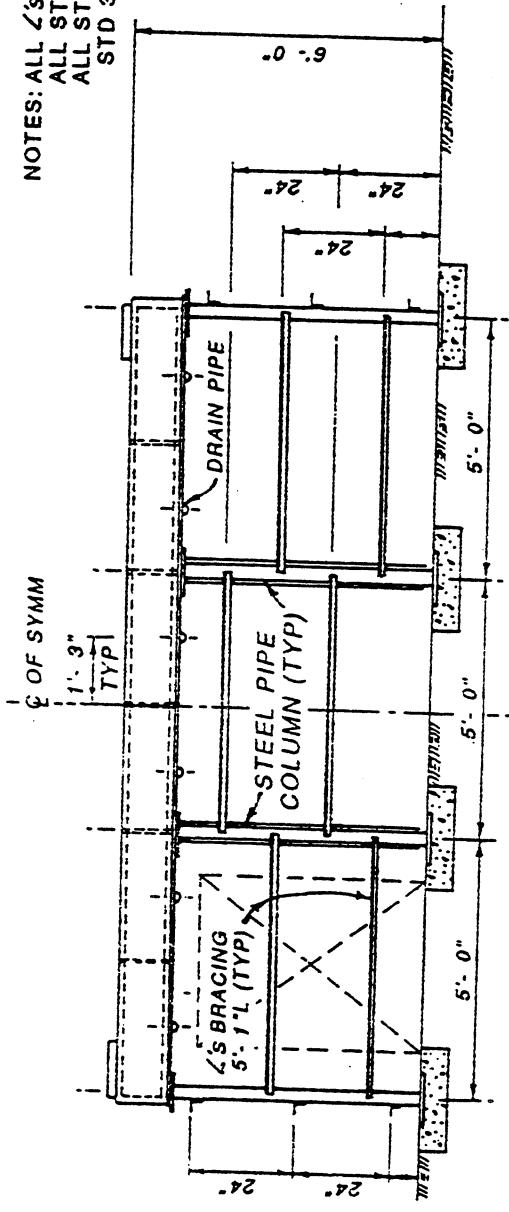


Figure 34

NOTES: ALL  $\angle$ 'S 2" x 2" x 1/4" THK  
 ALL STL PLS 1/4" THK  
 ALL STL PIPES  
 STD 3" Ø



TYP STORAGE RACK CONTAINMENT STRUCTURE

Figure 35

F/G 36

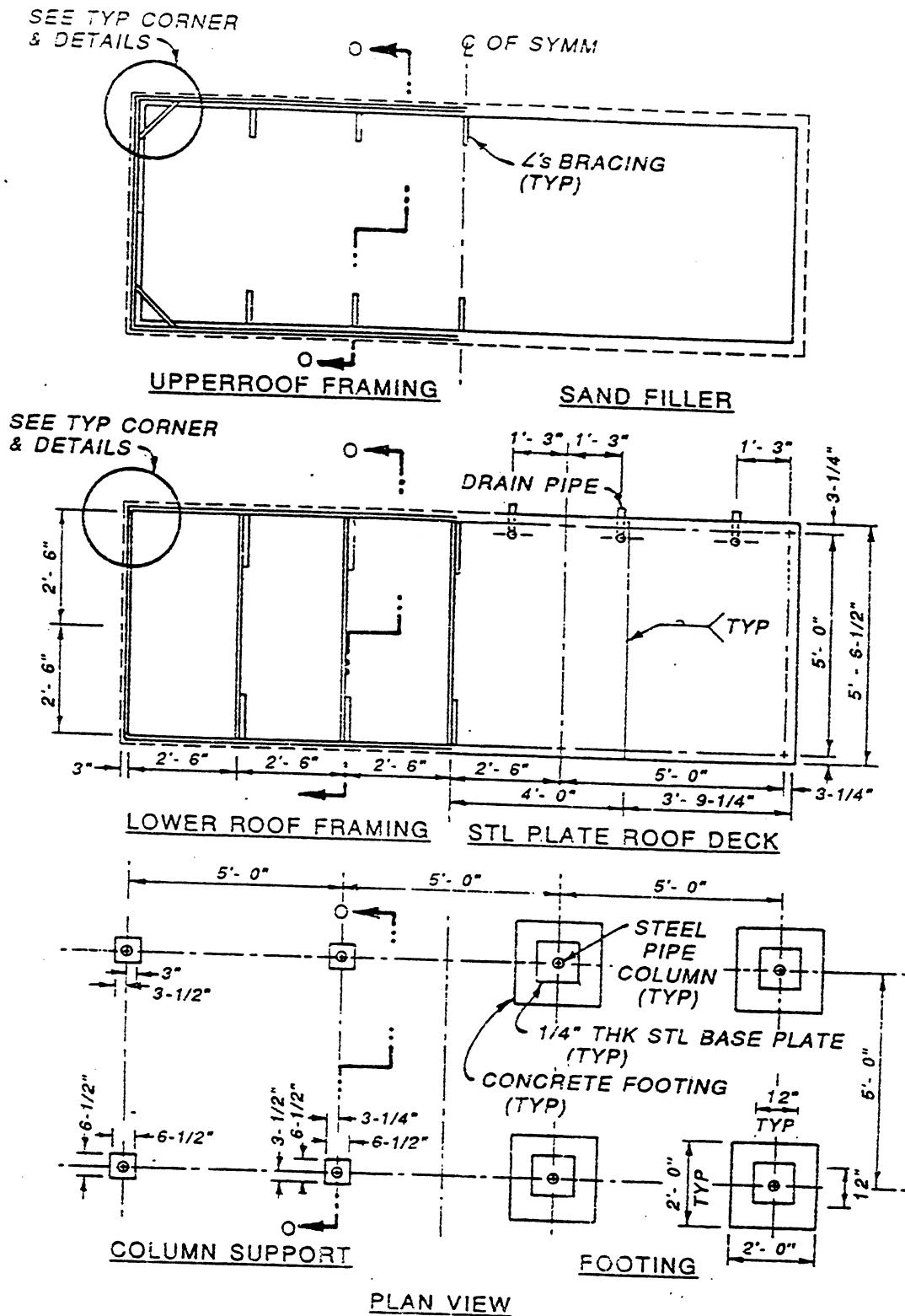
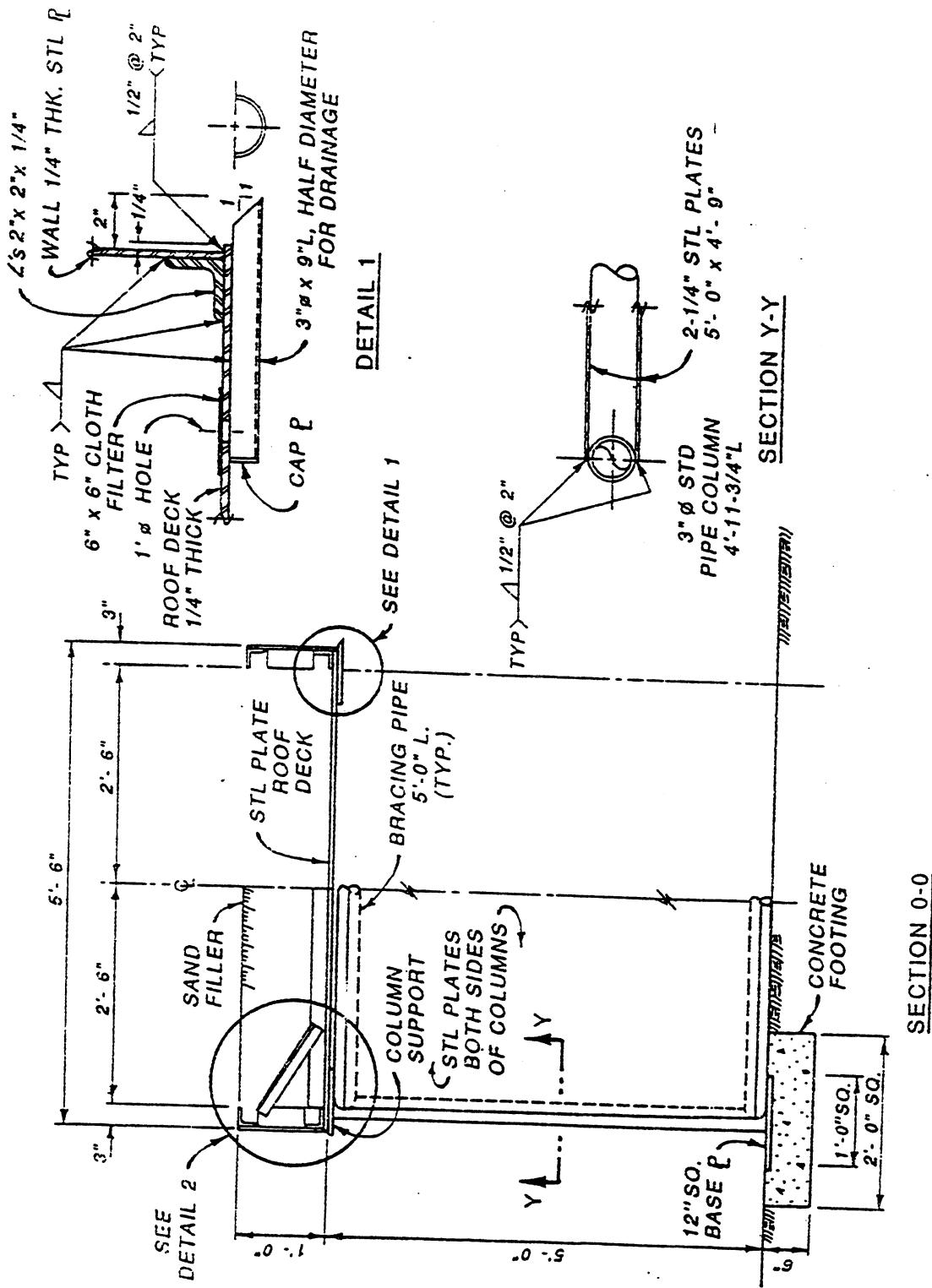


Figure 36



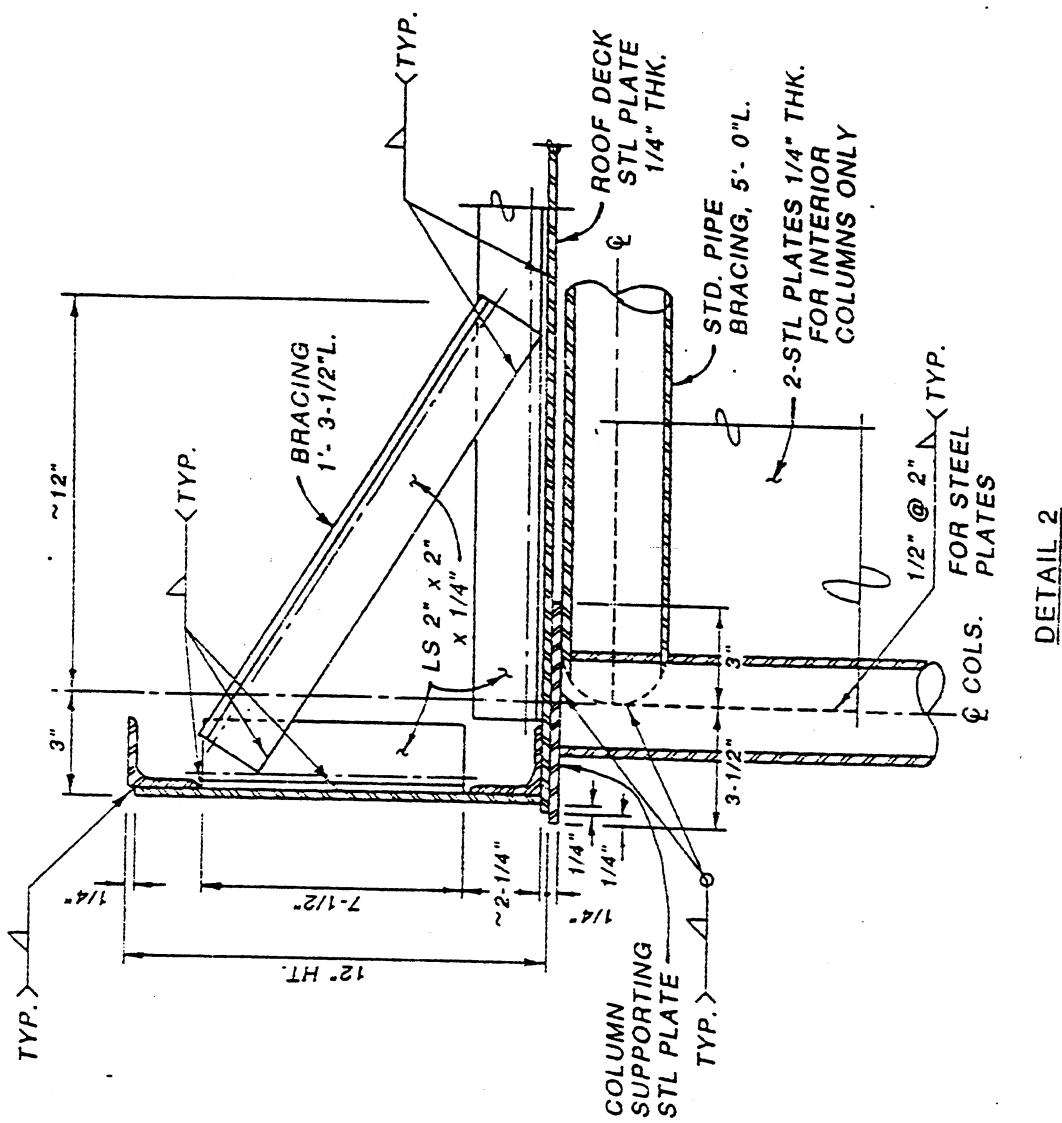


Figure 38

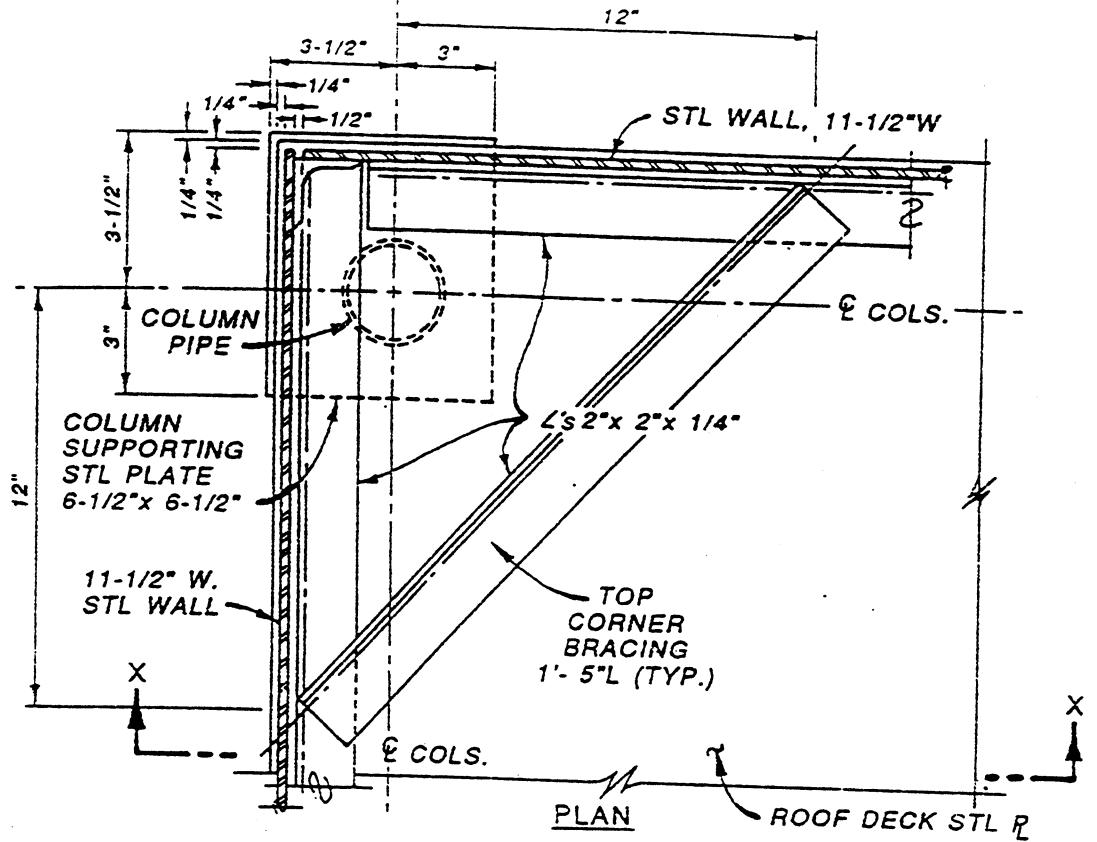
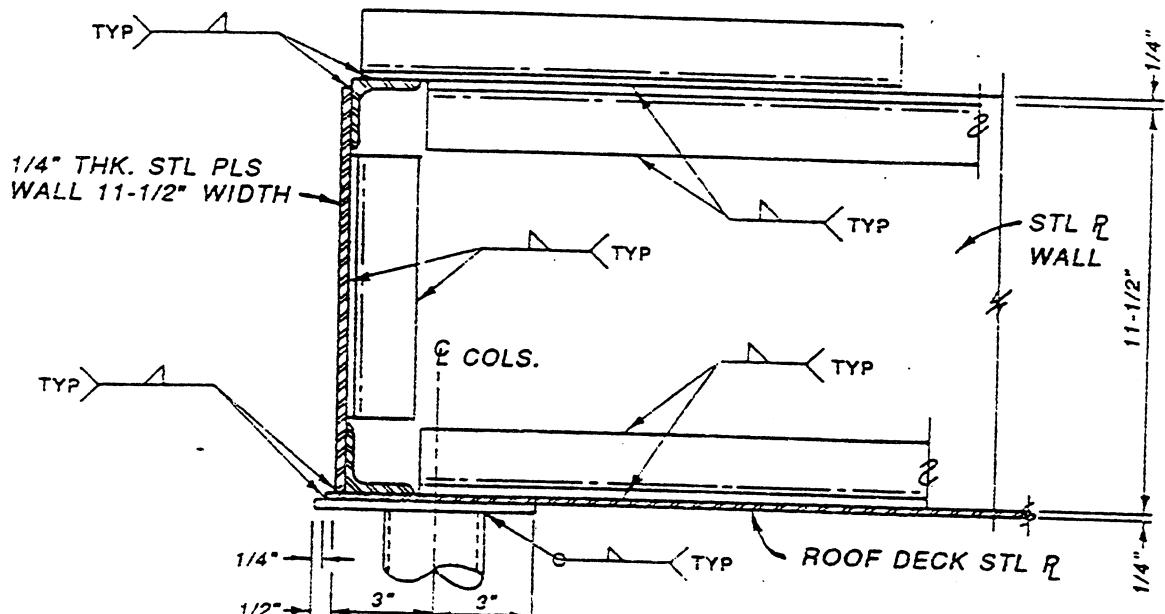


Fig. 39



SECTION X-X  
TYP. CORNERS & DETAILS

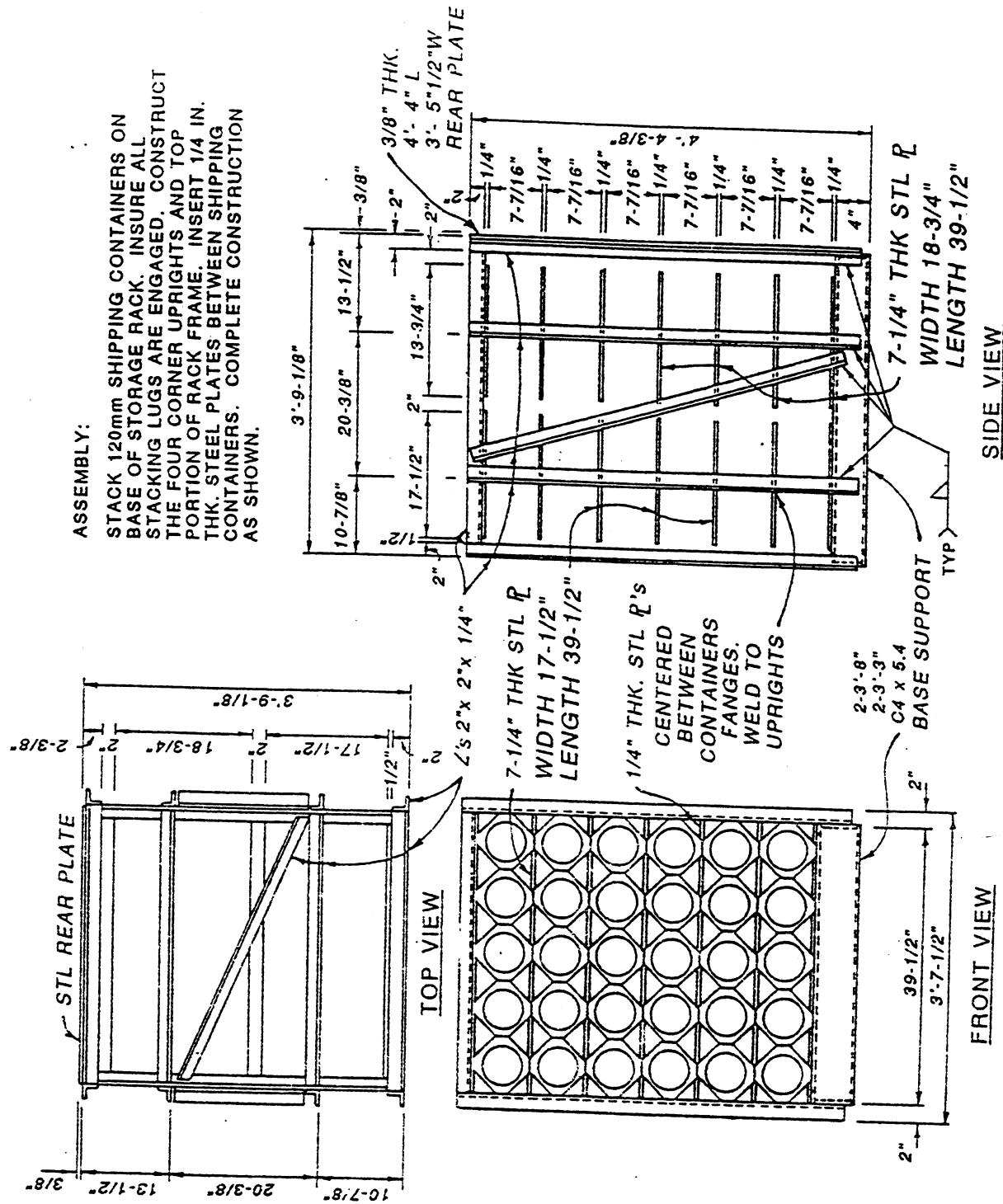


Figure 40

120mm AMMO RACK  
LOADING DETAILS  
BAYS #1 & #3

NOTE: SINCE ONLY 13 HE ROUNDS WILL BE USED AND 16 LOCATIONS ARE PROVIDED, LEAVE THE TWO OUTERMOST ROUND POSITIONS EMPTY IN BAY #1 AND THE OUTERMOST POSITION ON THE 3 ROW IN BAY #3.

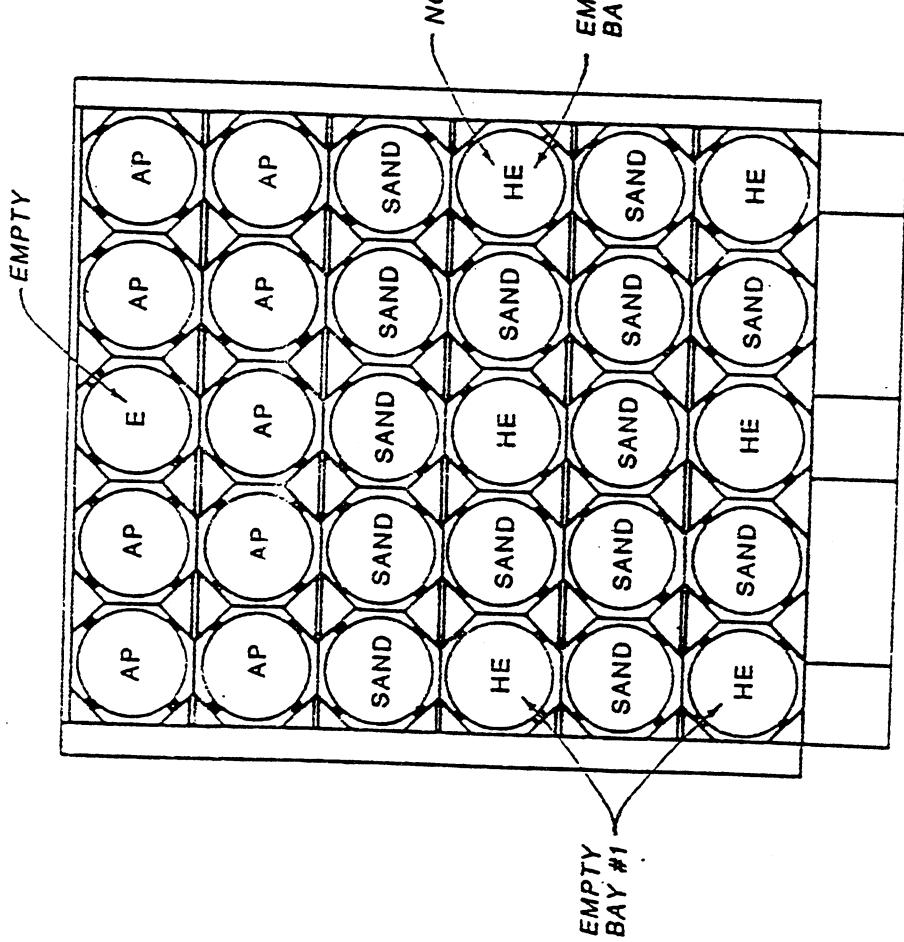


Figure 41

120mm AMMO RACK.  
LOADING DETAILS  
BAYS #2

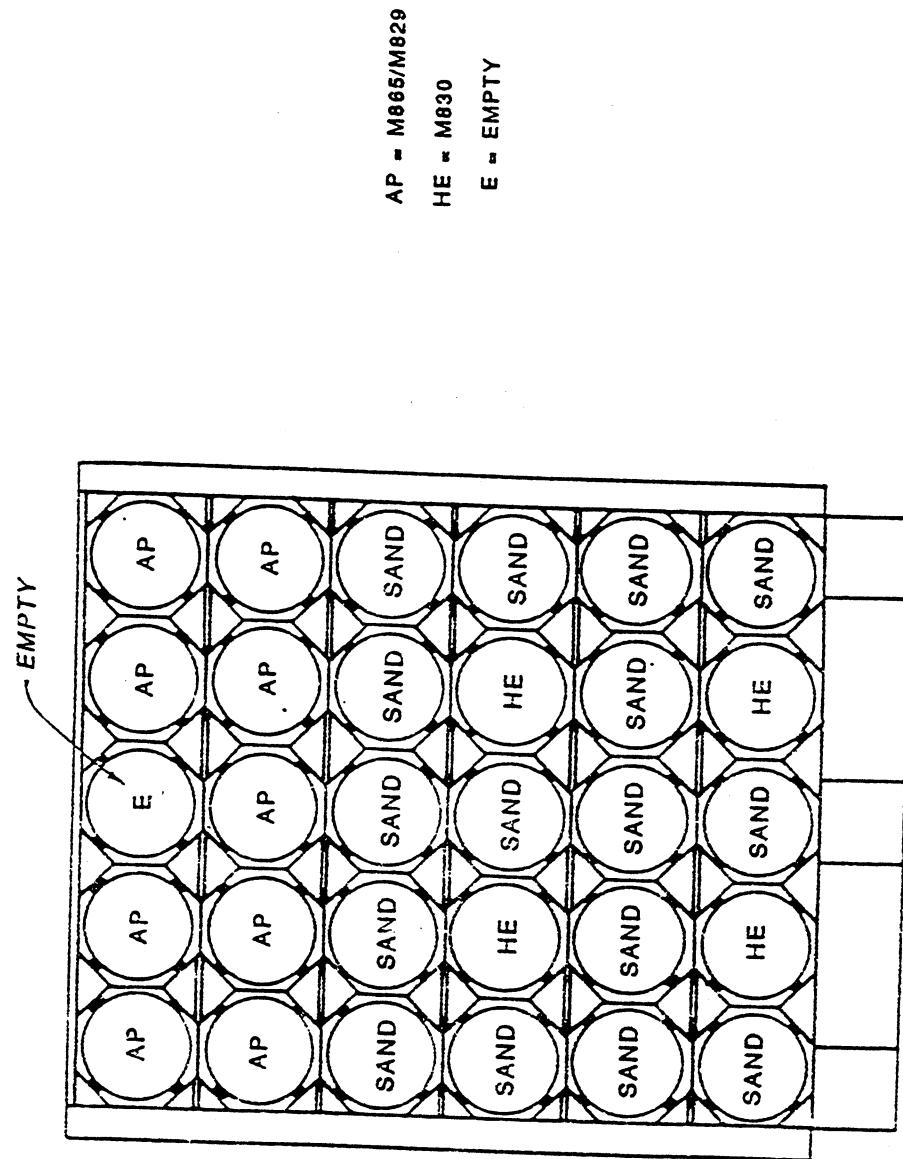
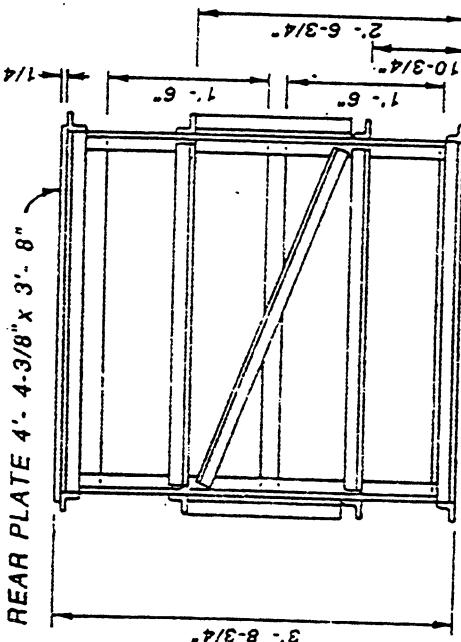
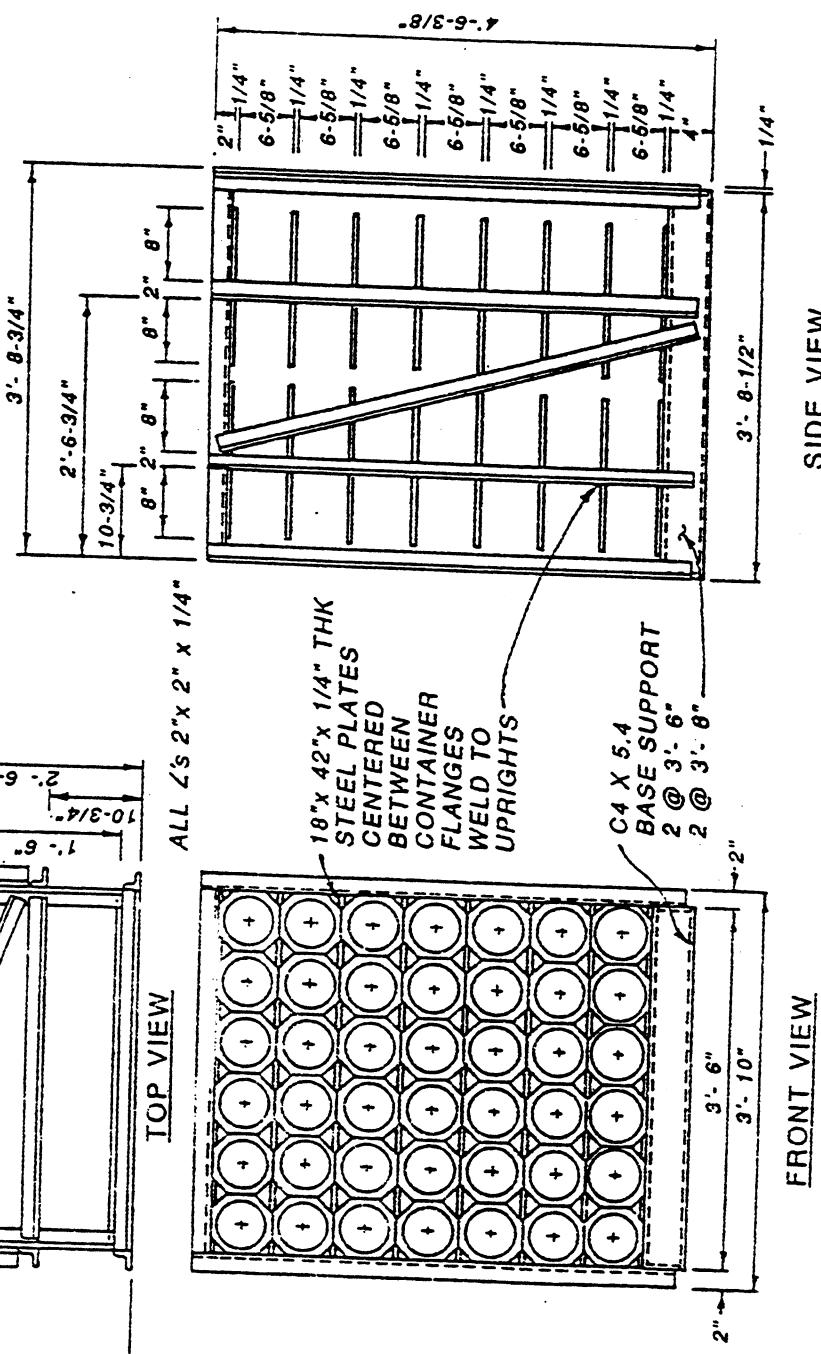


Figure 42



FRONT VIEW

ASSEMBLE 42 PA117 CONTAINERS ON BASE OF  
STORAGE RACK. INSURE ALL STACKING LUGS  
ARE ENGAGED. CONSTRUCT THE FOUR CORNER  
UPRIGHTS AND TOP PORTION OF RACK FRAME.  
INSERT 1/4 IN. THICK STEEL PLATES BETWEEN  
SHIPPING CONTAINERS. COMPLETE CONSTRUCTION  
AS SHOWN.

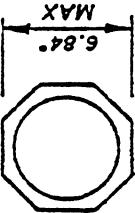


SIDE VIEW

TYP 105mm AMMO RACK

Jure 43

105mm AMMO RACK  
USING PA117 CONTAINERS  
LOADING DETAILS  
BAYS#s 1 & 3



HE = HIGH EXPLOSIVE ROUNDS  
E = EMPTY

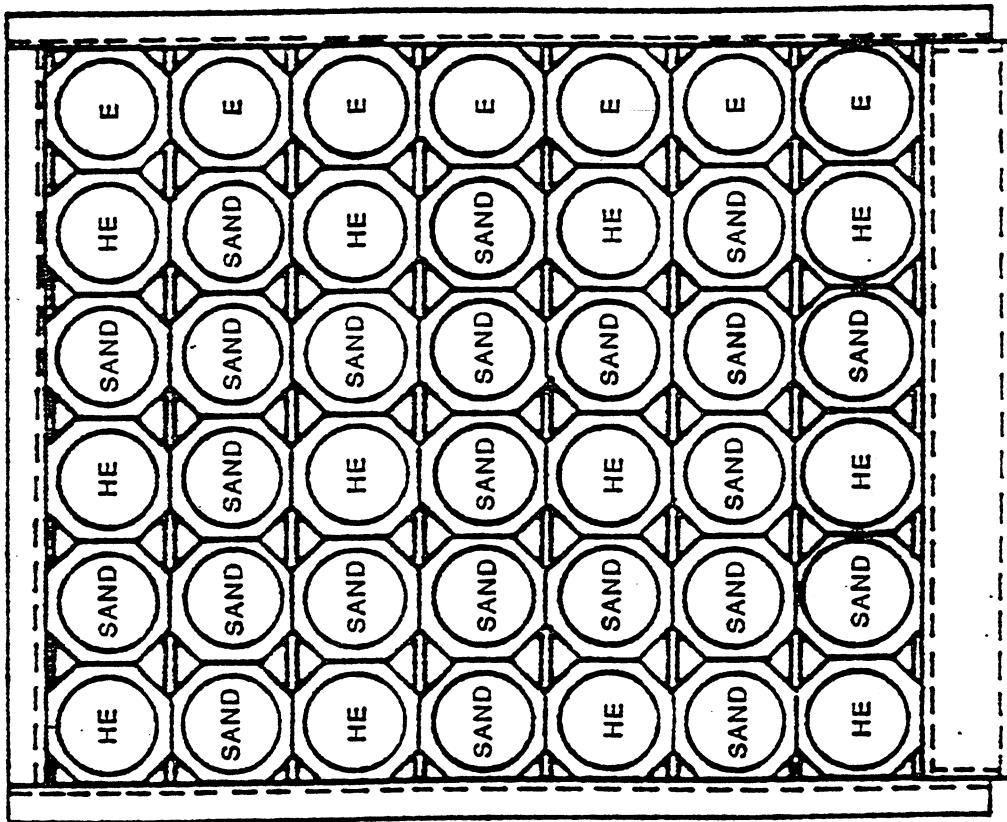


Figure 44 (REVISED MAR 1990)

105mm AMMO RACK  
USING PA117 CONTAINERS  
BAY #2 (ALL KE ROUNDS)

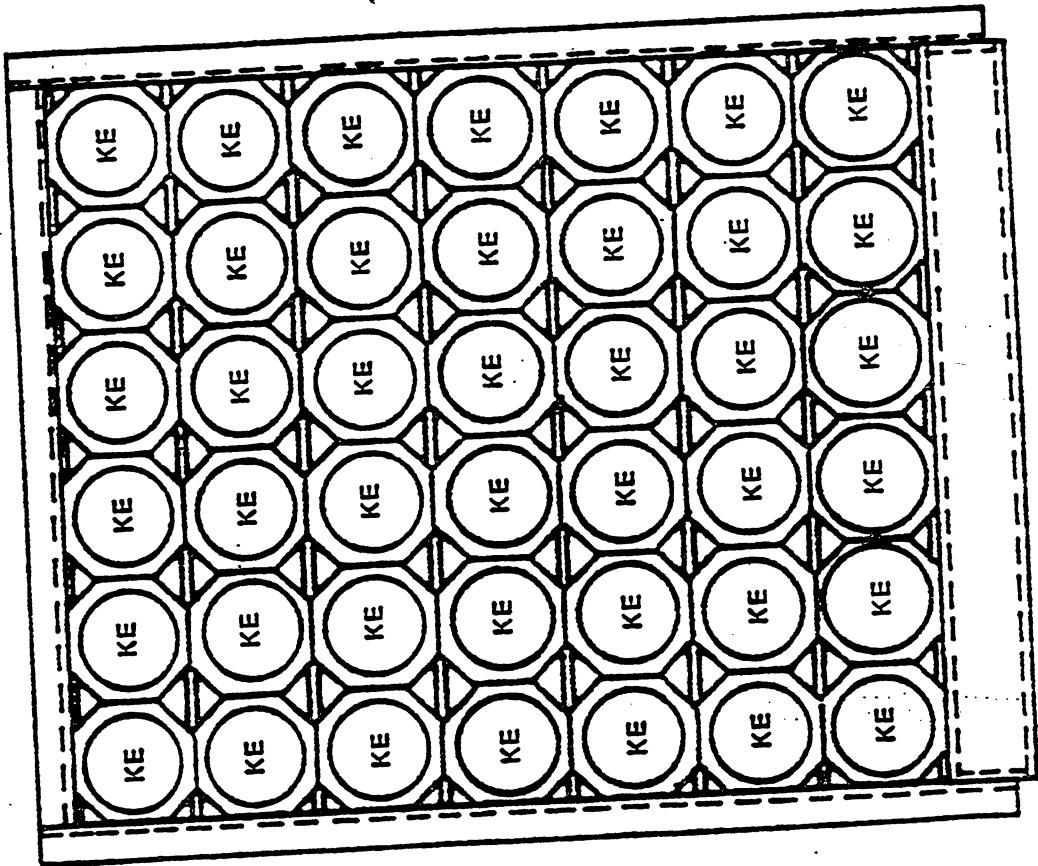


Figure 45 (ADDED MAR 1990)